



# CB QUARTERLY

Issue 24, December 2000

## From the DAR . . .

As the new deputy to acquisition and readiness for the U.S. Army Soldier and Biological Command (SBCCOM), I am looking forward to a myriad of new experiences. The mission of the Research, Development and Acquisition (RDA) Enterprise is to provide total life-cycle management for the research, development, acquisition, testing, systems integration, product improvement, fielding, and maintenance of the best soldier and chemical biological protective materiel. This means that we are responsible for products and innovations from start to finish, from research and development to logistics.

We recognize that we have not only a strategic imperative but a moral obligation to provide our troops with the highest quality CB protective equipment to enhance their performance, safety, and survivability on the battlefield.



*BG Philip M. Mattox*

In FY93, recognizing the immediacy of the biological threat, the Office of the Program Director for Biological Defense Systems was established at Edgewood. With the signing of the Biological Defense Program, the acquisition planning for the Biological Integrated Detection System (BIDS) began. This accelerated program consisted of three phases. Each phase was to upgrade the capability of the system as technology emerged. The first production unit was assigned, tested, and produced in 19 months – from paper to production in a year and a half was an acquisition success for both Edgewood and our customer. During the years of its existence, this office developed several systems. Recognizing that their job was done, the office was closed in September; our lead article describes their accomplishments.

Since the Gulf War, there has been increased concern for exposure to sub-acute and low levels of chemical warfare agents. In another article, we describe a new research thrust using toxicogenomics, a new scientific subdiscipline of Toxicology, to identify and characterize mechanisms of known and suspected toxicants.

We remain committed to providing robust logistical support to make sure the very latest innovations reach our service members intact and on time; fieldings of CB equipment are included in this document. Our organization will remain a vigilant environmental steward and will also work to build upon our great progress in acquisition reform to make sure we are doing business in the most efficient, productive, and cost-effective way possible.

As an organization, we are committed to teamwork not only within the larger command but also in regard to partnering with academia, private industry, and other government agencies. We also have some international partners. We discuss some of our partnering achievements in sections devoted to these areas.

Our continued commitment to excellence, teamwork, and partnering will ensure that our products and technologies will continue to benefit not only the Army, but the joint services and the civilian community well into the 21<sup>st</sup> century.

Headquarters  
of the U.S.  
Army Soldier  
and Biological



Chemical Command is located  
at the Edgewood Area of  
Aberdeen Proving Ground, MD.

Within SBCCOM's RDA Enterprise  
are the PM-Soldier Systems, PM-Soldier Support,  
PM-Force Provider, PM-NBC Defense Systems,  
Integrated Materiel Management Center, and the  
Research, Development and Engineering Center  
(RDEC). The RDEC consists of the Natick Soldier  
Center and the Edgewood CB Center. This  
publication is prepared at the Edgewood CB Center,  
incorporating CB-related information from the entire  
RDA Enterprise.

We publish this information under the auspices of  
AR 70-45, R&D Scientific and technical Information  
Program, which states that "The objectives of the  
S&TI Program are to—

a. Improve the flow of technical information into,  
through and from the Department of the Army in  
order to

(1) Secure economies by reducing RDTE lead  
time and by eliminating unnecessary duplication of  
effort,

(2) Improve RDTE program management and  
execution, and

(3) Support the information needs of scientists,  
engineers, and managers."

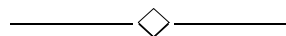
AR 70-45 further states "Department of the Army  
elements will provide for adequate interchange of  
technical information among themselves and with  
their contractors, the other military departments and  
Federal agencies, and, to the maximum extent  
consistent with national security, the US scientific,  
technical, and academic communities."

This document is distributed to over 1,200  
addressees throughout the Joint Services, industry,  
and academic R&D community, and it could be a  
vehicle to publicize what is going on where you are.  
Please submit articles to Director, Edgewood  
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# CONTENTS

Closing Ceremony for Program Director for Biological Defense Systems .....	2
Genomics and Proteomics: The Future of Defense Technology .....	5
The Improved Response Program .....	10
Improved Toxicological Agent Protective Ensemble (ITAP) .....	17
Joint Service Lightweight Integrated Suit Technology (JSLIST) .....	20
Joint Service General Purpose Mask .....	22
Lightweight Decontamination System (LDS) ...	23
Joint Service Sensitive Equipment Decontamination .....	24
Value Engineering Workshop .....	26
Fieldings .....	29
The Chemical Defensive Equipment Go-To-War Program .....	32
End Item Updates .....	34
Help Lines/Toll-Free Numbers .....	39
Briefs .....	40
Partnering: Cooperative R&D with Industry and Academia .....	41
Patents .....	44
Partnering: International Cooperative R&D ....	46
PM of the Year .....	48
People in the News .....	49
First Workshop on Point Detection for CB Defense .....	52
Symposia .....	55
Upcoming Conferences .....	56
Books, Journals, and Magazine Articles .....	57
Technical Reports .....	57



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# CLOSING CEREMONY FOR PROGRAM DIRECTOR FOR BIOLOGICAL DEFENSE SYSTEMS

*When in the course of human events . . .*

*by Joanne Coale*

**O**n September 27<sup>th</sup>, MAJ Brendan J. Powers, the Deputy to the Program Director for Biological Defense Systems, was the host of the Closing Ceremony for the program.

The ceremony began with the posting of the colors by a Color Guard from the Technical Escort Unit. Following the posting of the colors, the 389<sup>th</sup> Army Band played *Ruffles and Flourishes* and the *National Anthem*.

Opening remarks were delivered by Mr. Michael A. Parker, Deputy to the Commander. The Guest of Honor, MG John C. Doesburg, then spoke about the opportunity this office had to bring to fruition some significant changes in protecting our fighting forces against the biological threat. It is not often that we can see that we have made a significant mark. And now the job is done, and it is time to close the office.

Invited guest, Ms. Vicky Armbruster, Joint Program Manager for Biological Defense, spoke about the significant accomplishments this group provided to the warfighter. She said that they had provided the first capabilities for our warfighters

against biological agents, which can now be built upon by others.

Mr. Bruce W. Jezek, the Program Director, spoke briefly of the challenges and rewarding accomplishments of the organization over the past 8 years. He thanked all those who had helped to make these things happen and for the support of his team.

The Office of the Program Director for Biological Defense, during their short existence in history, managed to accomplish the following:

- Biological Integrated Detection System (BIDS). The BIDS is the first biological detection capability to be fielded to our soldiers. Its detection suite contains multiple technologies selected to detect various characteristics of a biological aerosol attack. Forty-one Non-development Item (NDI) systems were fielded to the 310<sup>th</sup> Chemical Company (USAR) at Fort McClellan, AL, by January 1997. Forty-two Pre-planned Product Improvement (P3I) systems were fielded to the 7<sup>th</sup> Chemical Company at Fort Polk, LA, between December 1998 and January 2000. The P3I BIDS contains the world's first

Biological Detector (BD) capable of automatically and simultaneously identifying multiple biological agents and represents a significant advancement in the ability to defend our forces against biological warfare attack. The development of the BIDS was accomplished in a remarkable 26 months from start to approval for production.

- Long Range Biological Standoff Detection System (LR-BSDS). The LR-BSDS, using NDI, provides for the first time, a long-range, large-area, aerosol cloud detection, ranging and tracking capability. The XM94 is a corps level asset which will provide early warning and aerosol cloud information to enhance contamination avoidance efforts and cue other biological detection assets. Detection information from the XM94 will be analyzed with other battlefield information and intelligence data to determine appropriate defensive measures. Type classification was received for the XM94 in only 25 months, and three systems were fielded to the 310<sup>th</sup> Chemical Company (USAR) at Fort McClellan, AL, in June 1997. The counter-proliferation LR-BSDS was to provide improved capability with more automation and complete

laser eye safety. Funding restrictions, however, caused the termination of this program in March 2000.

- The Short Range Biological Standoff Detection System (SR BSDS). This system enhances capabilities provided by the BIDS and LR-BSDS by providing early warning and verification that biological clouds are approaching, as well as making early standoff detections in conditions for which the LR-BSDS is not designed. One prototype SR-BSDS has been designed, fabricated, and is being tested. It is a candidate for demonstration at the Joint Biological Remote Early Warning System (JBREWS) Advanced Concept Technology Demonstration (ACTD).

- Chemical Biological Mass Spectrometer (CBMS). The CBMS is designed to detect and presumptively identify threat biological and chemical agents. The CBMS Block I was developed in 1993-1997 for use primarily as a biological detector. The CBMS Block II, developed in 1997-2000, is smaller, lighter and will have better sensitivity and improved reliability and maintainability. It will provide significant enhancements over the Block I by simultaneously detecting and presumptively identifying all chemical and most biological threat agents. The CBMS Block I was included in the M31A1 BIDS to provide biological detection and classification. We produced and fielded 50 Block I systems during FY98/99. The CBMS Block II will complete development in 2000 and is currently being integrated into

the Joint Service Light NBC Reconnaissance System and Fox Block II.

- Integrated Biodetection Advanced Technology Demonstration (ATD). This ATD demonstrates two technologies: one that provides a pre-exposure warning for a biological attack, and another that provides an order-of-magnitude increased sensitivity to agents while adding a first-time virus identification capability with significantly reduced logistics. The Tier 1 particle counting technology has been transitioned to the Portal Shield and JBREWS ATD programs as well as the Joint Biological Point Detection System program. Both Bio ATD technologies were demonstrated at the Maneuver Support Battle Laboratory and U.S. Army Chemical School sponsored Battlelab Warfighting Experiment in FY99. A Tier2 and Tier3 were since developed to accommodate additional requirements of lower power, weight, size, and the absence of any consumables. The project was completed in December 1999.



Following the speakers, MG Doesburg presented *Meritorious Civilian Service Awards* to Mr. James Cannaliato, Mr. Patrick Berry, and Mr. Bruce Jezek.

The formal ceremony concluded when the Army Band played *The Army Song* and the unit retired the colors.

Mrs. Edwina (Tykie) McNerney, SBCCOM Protocol Officer, coordinated the event.

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NDI BIDS (M31)

**DEVELOPED BY  
PROGRAM DIRECTOR  
FOR BIOLOGICAL DEFENSE  
SYSTEMS**

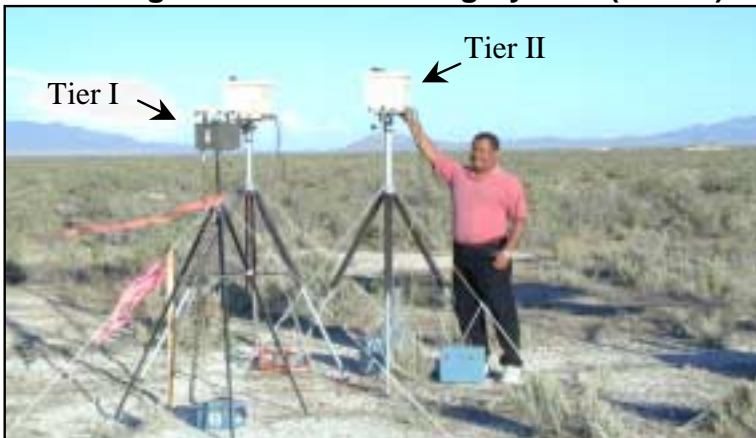


CBMS Block II



CP LR-BSDS

### **Biological Aerosol Warning System (BAWS)**



Attack Warning

### **Automated DNA Diagnostic (ADD)**



Identification

# GENOMICS AND PROTEOMICS: THE FUTURE OF DEFENSE TOXICOLOGY

*Toxicogenomics is a new scientific subdiscipline . . .*

*by Dr. Jennifer W. Sekowski, Dr. Akbar S. Khan, Dr. Kevin P. O'Connell, and Dr. James. J. Valdes*

**T**he cutting edge of Department of Defense toxicology is pushing the capabilities of military toxicology far beyond the foundations built during the World Wars. Toxicology, most simply defined, is the study of poisons.

The history of modern military toxicology can be traced to World War I, when 100,000 Allied soldiers were killed and one million wounded by poison gas.<sup>1</sup> At the same time, the incredible growth of the U.S. munitions industry brought to light the importance of industrial environmental toxicology. After thousands were killed or injured due to exposure to TNT and nitrous gases in U.S. munitions plants, it was impossible to deny the critical importance of understanding industrial as well as warfare toxicants.<sup>2</sup>

The vast arsenal of chemicals developed during World War II brought with it new toxicological issues as soldiers were exposed to increasingly complex chemical mixtures during the routine operation and maintenance of their machinery and, in some climates, to the protective agents designed to

combat disease-carrying insects and pathogens.

Toxicology, most simply defined, is the study of poisons. Toxicology traditionally has consisted of chemical exposures to animals followed by observations of a limited number of physiological changes, including death. Toxicogenomics is a new scientific subdiscipline that combines the emerging technologies of genomics and bioinformatics to identify and characterize mechanisms of action of known and suspected toxicants.

Since then, the continued development of chemical warfare agents worldwide, as well as their demilitarization, has created a growing operational concern for exposure to these agents not only in wartime activities, but also from potential terrorist activities. Occupational and environmental concerns have grown too, not only due to aging arsenal stockpiles in the United States but also due to exposure of U.S. troops to toxic industrial chemicals (TICs) and materials (TIMs) and natural environmental toxicants during deployments to countries where manufacturing and disposal

methods are outdated and virtually unregulated.

Overall, concerns for soldier and civilian chemical safety have created an impetus for research regarding the physiology, pathology, and therapy of acute and chronic chemical agent injury.<sup>1</sup> In fact, much of that toxicology work was carried out at the Chemical Systems Laboratory at the Edgewood Area of Aberdeen Proving Ground (APG), Maryland, from WWI through 1979<sup>1</sup> and continues today under the auspices of the Edgewood Chemical Biological Center (ECBC) and the U.S. Army Medical Research Institute of Chemical Defense (MRICD).

Since the Gulf War, however, there has been increased concern for exposure to sub-acute and low levels of chemical warfare agents.<sup>3,4</sup> Personnel involved in the decontamination of equipment, the destruction of chemical weapons, and those on the periphery of an attack are at risk for such low-level, possibly asymptomatic, exposure to chemical warfare agents. Although such exposure may not cause immediate or obvious pathology at the time of exposure, it may cause

alterations at the molecular level that will be manifest as altered genetic regulation, and this may predispose the exposed person to some ailment that will arise later in life. While acute, high-dose exposure to a single chemical is a straightforward toxicological issue, the reality is that low-level exposures are far more likely and often occur in combination with other wartime chemicals such as large area insecticides, skin insect repellents (e.g., DEET), medical countermeasures (e.g., pyridostigmine bromide, atropine, oximes), vaccinations, depleted uranium, chemical agent resistant coatings, and a host of other factors.<sup>3,4</sup> Thus, defense toxicology will increasingly rely on advances in science that will facilitate investigation into the molecular underpinnings of injury and disease that result from low-level exposure to complex chemical mixtures. This article briefly describes two complementary approaches that identify the molecular targets of low-level chemical exposure.

The vast majority of drugs and toxicants act by binding to protein targets, these being receptors, ion channels, enzymes, or secondary messenger molecules. These interactions almost inevitably affect a signal within the cell, often a stimulus that alters gene expression.<sup>4</sup> These alterations, which can occur weeks before any obvious pathology or morbidity, can be measured and visualized by changes in global mRNA or protein expression profiling. Thus, for every drug or toxicant there exists a gene profile regulation pattern, or molecular “fingerprint.” A molecular fingerprint of a toxicant

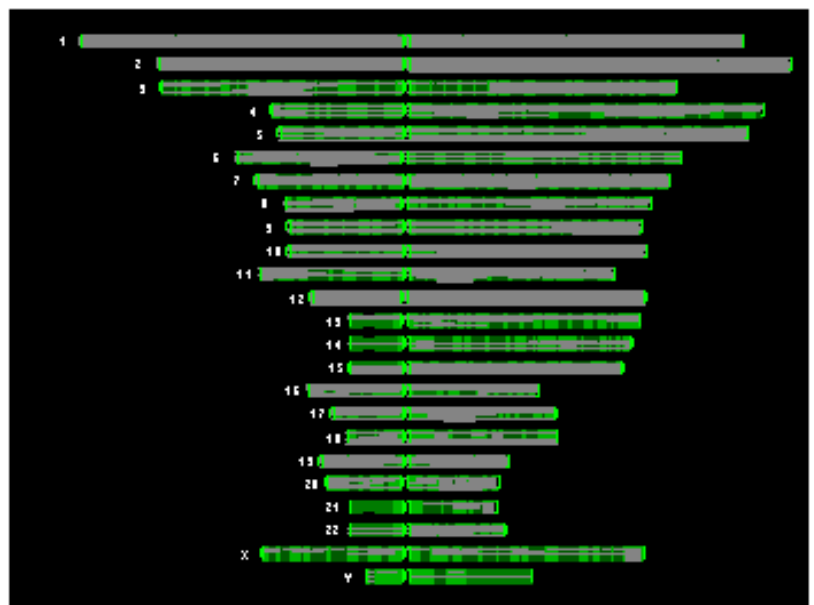
contains valuable information regarding both its mechanism of action and route of toxicity. Molecular profiling of a toxicant will greatly enhance detection of molecular events altered by low-level exposures, identification of biomarkers of exposure, determination of individual sensitivities to certain agents, and serve as prognostic indicators of injury or disease. The great advantages of this approach, over traditional toxicology, are that it gives a very early indication of toxicity and can provide a before-and-after deployment genetic profile of the individual.

### Genomics

The first part of building a molecular profile of a particular toxicant entails gaining an

understanding of which genes’ expression are altered as a result of exposure to it. Measurement and analysis of the genetic material of an organism is known as genomics. The quantification of the level of message coded from a particular gene (i.e. transcription) is made possible through measurement of the level of mRNAs.

Several important developments in the field have made the quantification and identification of mRNAs (i.e. transcripts) possible. First, rapid and automated large-scale DNA sequencing (reading of the code) technology has made it possible for laboratories around the world to decode the entire genomes of many organisms, including humans.



*Image of the human chromosomes. The intensity of expression of the genes detected by the Human Genome U95 Set GeneChip (Affymetrix) is displayed at the location of the particular gene on the chromosomes. This display of data was generated from an analysis performed using GeneSpring software (Copyright Silicon Genetics).*

Having access to the entire sequence of a normal genome makes it possible to identify differences in a diseased organism's genome, or one that has been exposed to a chemical agent. A second technological advance, made possible through progress in genome sequence knowledge, is DNA array technology. Through DNA array (or "gene chip") technology, the simultaneous increase or decrease in abundance of a gene's mRNA molecules, the messages that code for cellular proteins, is made possible. Briefly, the mRNA is prepared from control and treated cells, or tissue from exposed animals or humans, and DNA copies are made enzymatically in the presence of fluorescently labeled nucleotides. The labeled cDNAs are then hybridized to the gene chip and the pattern of fluorescent signals from the array is measured by laser scanning confocal microscopy.

The pattern is then translated by a computer into meaningful expression profile data. The ratio between the signals from the control and exposed sample arrays reflect the relative toxicant-induced change in the genes' response to the toxicant exposure.

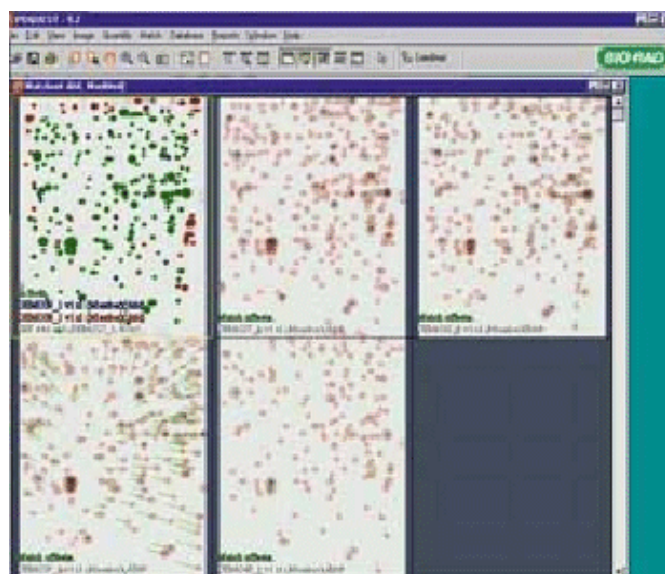
### **Proteomics**

While the first half of a molecular toxicological profile explores the effects of toxicants at the level of gene transcript regulation, there are other toxicological effects that may only manifest in the downstream molecular events. The downstream processes following gene transcription, such as translation (i.e. assembly of the amino acids,

the building blocks of proteins, according to the mRNA transcript), post-translational processing of the polypeptide or protein, and subsequent activity of the coded protein, are very sensitive to perturbation by toxicants. The study of these events and cellular proteins is termed proteomics.

Overall, proteomics strives to capture a picture of the control of the production and processing of proteins, the ultimate products of genes. Thus, the perspective gained from proteomic analysis is much closer to the ultimate control of cellular function than is the perspective gained from genomics, and together they provide a complete molecular analysis.

The two technologies which have made proteomics possible are two-dimensional gel electrophoresis (2-DE) and mass spectrometry. 2-DE can separate nearly all of the proteins in a cell or tissue by their isoelectric point and by mass/charge ratio.<sup>5</sup> The product is a rectangular slab of protein spots that are usually visualized by staining. From this, the ratio between the optical density of the 2-DE spots of the control and exposed samples are compared to search for toxicant-associated alterations.



*Comparative analysis of 2-dimensional electrophoresis (2-DE) data from several experiments using PD Quest software (Copyright BioRad Laboratories). This type of proteomic analysis can detect subtle changes in cellular proteins, which occur in the tissue or cells of an animal or human, as a result of exposure to various military and industrial chemicals.*

In addition, the composition and identity of the interesting altered polypeptide spots can be determined by mass spectrometry. This provides a very sensitive means by which to discover protein alterations caused by exposure to a particular toxicant, which might not be otherwise detected at the level of gene expression.

### **Total Expression Analysis**

Bioinformatics plays a key role in organizing, storing, and making sense of the massive amounts of data accumulated in the generation of genomic and proteomic expression profiling. Once a mass of high quality quantitative expression data has been collected, it is important to visualize the complex patterns of gene and protein expression. This is necessary in order to correlate

toxicant exposure with the involved genes, or sets of genes, and to identify key biochemical pathways that may be affected. As the database grows, powerful software is required to identify differences and trends between different sets of exposure regimens and between different toxicants.

Now and in the future, this type of complex toxicological profiling will yield critical information needed to make strategic military decisions. In fact, the Joint Future Operational Committee (JFOC) has issued recommendations to develop these types of toxicological capabilities including the ability to

(1) detect acute as well as low-level chronic exposure to toxicants (JFOC 3.3 –3.4),

(2) predict disease association with toxicants (i.e. find biomarkers/prognostic indicators) (JFOC 3.3-3.4),

(3) assess chemical predispositions and sensitivities of soldiers to toxicants (JFOC 3.1, 3.3), and

(4) improve point detection of toxicants necessary for battle management, contamination avoidance, and individual and collective protection (JFOC 3.1-3.4).

These are precisely the types of questions that are suited to investigation using genomic and proteomic approaches.

### **Conclusion**

The basic methodology of chemical warfare agent, TIC, and TIM toxicological safety evaluation has changed little during the decades following the World Wars. In the years following the Gulf War, however, attention has shifted toward lower-level exposures, exposure to complex mixtures of military and industrial chemicals, and toward the more subtle molecular consequences of these types of exposures. Genomic and proteomic technologies are poised to address the current high priority JFOC initiatives and to grow with the future of defense toxicology, providing the tools to improve risk assessment, enhance soldier performance, and protect both the short- and long-term health of the soldier.

### **References:**

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<sup>3</sup>Jamal, G.A., "Gulf War syndrome-a model for the complexity of biological and environmental interaction with human health," *Adverse Drug React Toxicol. Rev* **17**(1), 1-17 (1998).

<sup>4</sup>McDiarmid, M.A.; Keogh, J.P.; Hooper, F.J.; McPhaul, K.; Squibb, K.; Kane, R.; DiPino, R.; Kabat, M.; Kaup, B.; Anderson, L.; Hoover, D.; Brown, L.; Hamilton, M.; Jacobson-Kram, D.; Burrows, B.; Walsh, M.; "Health effects of depleted uranium on exposed Gulf War veterans," *Environ. Res.* **82**(2), 168-80 (2000).

<sup>5</sup>Steiner, S. and Anderson, N.L., "Expression profiling in toxicology-potentials and limitations," *Toxicology Letters* **112-113**, 467-471 (2000).

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*Left to right: Dr. Akbar S. Khan, Dr. Kevin P. O'Connell, Dr. Jennifer W. Sekowski, and Dr. James J. Valdes*

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# THE IMPROVED RESPONSE PROGRAM

## *Helping the civilian community . . .*

by Dr. Mohamed Athher Mughal and Dr. Paul David Fedele

### **Introduction**

In March 1995, members of the Aum Shinrikyo Japanese cult attacked the Tokyo, Japan, subway system with sarin nerve agent. The incident captured international attention and sensitized world leaders to the threat of terrorist use of weapons of mass destruction (WMD). The threat of chemical and biological terrorism is increasing. The knowledge needed to produce deadly chemical and biological (CB) agents is more readily available than ever before. The death and disruption that can be caused by such agents is the professed goal of terrorists.

Recognizing this increasing threat and not waiting until a chemical or biological terrorism disaster had already occurred, the 104th Congress of the United States passed Public Law 104-201, the National Defense Authorization Act for Fiscal Year 1997. This Act contained Title XIV--*Defense Against Weapons of Mass Destruction*, which provided for preparedness training against WMD for our nation's first responders. Because the Department of Defense (DoD) is experienced in defending against chemical and biological agents, Section 1415 of Title XIV stated, "The Secretary of Defense shall develop and carry out a program for

testing and improving the responses of federal, state, and local agencies to emergencies involving biological weapons and related materials and emergencies involving chemical weapons and related materials." As a result of this legislation and in support of DoD, the U.S. Army Soldier and Biological Chemical Command (SBCCOM) developed an improved response program (IRP).

The IRP is a multi-year analytical program designed to identify and demonstrate the best practical approaches to improve the overall preparedness of the United States to respond to domestic acts of terrorism involving CB or CB-related materials. This article describes the IRP's program mission, major products, and future.

### **IRP Mission**

The U.S. military has unique national resources in CB defense technologies and concepts. The IRP is designed to leverage these resources to enhance the overall preparedness of civilian emergency responders and managers to respond to and mitigate the consequences of a domestic CB terrorist event. As such, the IRP maintains a partnership between military CB experts and civilian responders and emergency

managers at the federal, state, and local levels. Civilian participants represent functional specialties including emergency management, law enforcement, firefighting, emergency medical services, hazardous-materials management, and public health.

Using this diverse cross-section of participants, the IRP has identified, prioritized, and developed solutions to the most pressing response issues associated with domestic CB terrorism. By engaging a nationally representative group of civilian emergency managers and responders from the program's inception, the IRP has retained an analytical focus bounded by the real-world needs of these civilian response professionals.

### ***Chemical and Biological Agents, Functional Dichotomies***

According to the Centers for Disease Control and Prevention, one of the most significant differences between CB events is the way medical consequences will unfold over time. For instance, the medical casualties of chemical terrorism would usually be "immediate and obvious."<sup>1</sup> Alternatively, biological terrorism "will not have an immediate impact because of the delay between exposure and onset of illness."<sup>2</sup>

Because of these time differences in effects, chemical terrorism will usually have an identifiable incident scene while biological terrorism will not. The casualties of chemical terrorism will be readily observable, whereas the casualties of biological terrorism may not know that they are infected until days after initial exposure.

Because of these significant differences between the consequences of CB terrorism, different disciplines of first responders will be engaged in managing the consequences of each kind of incident. Chemical terrorism will likely engage firefighters, law-enforcement personnel, and emergency medical services that converge at an incident scene. Biological terrorism will likely engage nurses, physicians, and other medical providers who treat patients at hospitals and clinics days after the initial event. Because of the different nature of consequences between biological and chemical agents, IRP analyses are focused separately in these two areas.

### ***Characteristics of Domestic Bioterrorism***

The overriding consequence of a large-scale, unannounced bioterrorist attack will be the anomalous occurrence of a large number of medical casualties.<sup>3</sup> Response systems must be capable of providing the appropriate types and amounts of medical treatments and services. However, the full spectrum of potential consequences is much broader than medical casualties.

A well-conducted bioterrorist attack will strain our nation's public health medical-surveillance systems. It will also require responders to make quick, accurate medical diagnoses and disease identifications. By definition, a bioterrorist event is a criminal act that requires a complex criminal investigation. Depending on the agent used in an attack, such an incident could also result in residual environmental hazards that would require mitigation. Considering the potential magnitude of casualties, a significant portion of a metropolitan area's population may have to be medically managed and physically controlled. The aforementioned medical-treatment, criminal-investigation, environmental-hazard-mitigation, and population-control activities will require a coordinated and integrated command and control effort extending across federal, state, and local jurisdictions. In short, the full spectrum of consequences that will have to be managed encompasses multiple professional disciplines and functional areas of responsibility spanning three levels of government.

### ***Designing the Biological Weapons (BW) IRP Team***

The above considerations influenced the makeup of the BW IRP team in fundamental ways. Because the problems inherent in a bioterrorist attack are multifaceted, the SBCCOM needed a multidisciplined team that included participants from federal, state, and local emergency-response organizations. Recognizing the

technical complexities surrounding biological weapons and terrorism, the SBCCOM also included experts in the offensive and defensive aspects of BW. The final team consisted of more than 60 federal, state, and local responders, as well as technical experts from nine states. At the federal level, eight federal agencies, six Department of Energy national laboratories, and 11 DoD organizations were represented.

Having assembled a strong team, the SBCCOM began to define broad parameters of the overall process for the BW IRP. The process first had to provide a forum to educate and inform the entire interdisciplinary and multi-agency team on the offensive and defensive aspects of BW and bioterrorism. Second, the process had to yield an initial set of integrated response activities designed to manage and mitigate the full spectrum of consequences that would emerge from a large-scale, domestic bioterrorist event.

### ***The BW IRP Process***

The BW IRP process was designed around five 3-day technical workshops. Each day of the five workshops was similar in structure, but different in content.

Day one of each workshop consisted of a series of 1-hour tutorials on preselected topics such as the physics of aerosol dispersion, pathogenic microbiology of BW agents, biodetection, medical prevention and intervention, and decontamination of and physical protection against BW agents. Although the topics remained the

same, the depth and complexity of the tutorials increased as the team progressed through each of the five workshops.

Day two of each workshop began with the presentation of a selected BW terrorist-attack scenario. From Workshop 1 through Workshop 5, the respective terrorist-attack scenarios increased in scale from an attack on a single building to an attack on an entire metropolitan area. After reviewing each scenario, workshop participants identified a series of specific response activities designed to mitigate the emerging consequences of the given bioterrorist-attack scenario.

On day three of each workshop, the team reviewed and integrated the complete set of response activities. The team also analyzed the integrated activities to identify response shortfalls and possible response improvements. Throughout the reviews, the team took a “bottom-up” approach and *let the problem drive the solution*.

### ***BW IRP Products***

The BW IRP team identified a myriad of response activities spanning multiple functional areas. To be useful and understandable, these activities needed to be organized into a logical and integrated response system. Thus, the team formulated a generic bioresponse template (see accompanying chart) that embodied the concepts and work breakdown structure a city needed to respond to effectively in a bioterrorist event. This template serves as a useful starting point for cities and states in

preparing their own local plans to respond to a bioterrorist attack.<sup>4</sup>

### ***Chemical Terrorism***

SBCCOM possesses world-class technical experts who are knowledgeable in how to defend against and deal with the use of chemical warfare agents on military battlefields but not necessarily in civilian environments. They recognized the need to work closely with civilian emergency responders to identify and solve many of the unique difficulties in civilian response to chemical terrorism. Direct involvement of civilian emergency responders in the CW IRP was essential. This involvement contributed to the ready acceptance of response guidance developed by the chemical weapons (CW) IRP and made the program a success across the

national emergency response community.

Early in the program, Baltimore, Maryland, aggressively pursued a partnership with the CW IRP. Surrounding jurisdictions, including Baltimore, Harford, Howard, and Montgomery Counties, also were anxious to participate and joined the program. The CW IRP also worked closely with the U.S. Army Medical Research Institute of Chemical Defense. The medical expertise and extensive experience of the institute’s personnel were invaluable in all CW IRP efforts. They taught military physicians, nurses, medics, and combat lifesavers how to manage and treat chemical-agent victims. With added participation by several state and federal agencies and with individual participation from

<b>BW IRP RESPONSE TEMPLATE OUTLINE AND WORK BREAKDOWN STRUCTURE</b>	
2.1	Public Health Surveillance
2.2	Medical Diagnosis
2.3	Epidemiological Investigation
2.4	Mass Prophylaxis
2.5	Criminal Investigation
2.6	Residual Hazard Assessment and Mitigation
2.7	Control Affected Area/Population
2.8	Care of Presented Casualties and Worried Well
2.9	Fatality Management
2.10	Command and Control
2.11	Resource and Logistical Support
2.12	Continuity of Infrastructure
2.13	Family Support Services

representatives of emergency response organizations from across the nation, the CW IRP has grown into a team with diverse expertise that includes specialists in chemical weapons environmental and medical effects, fire-fighting response, law enforcement, hazardous materials mitigation, and overall emergency management.

The CW IRP is organized into four groups that address distinct functional areas in an emergency response. These groups address law enforcement, public health and safety, emergency management, and emergency response. Each group conducts table-top and functional exercises that help identify the difficulties encountered in civilian response to chemical terrorism. Once identified, these difficulties are addressed using a think-tank approach involving the overall CW IRP.

In developing solutions to these difficulties, the CW IRP relies on technical studies conducted by its chemical-defense experts. Solutions often involve novel applications of equipment and techniques that emergency responders already employ in other emergency situations. The CW IRP's unique combination of chemical-warfare-agent expertise and operational know-how in civilian emergency response enable it to develop improved response guidance and methods that are scientifically accurate and operationally practicable. Improved response guidance and methods often use equipment and skills that civilian responders may possess already.

To ensure that new response concepts are workable, they are operationally tested in functional exercises, demonstrating and validating their suitability. When the CW IRP's improved response guidance and methods have been fully validated and demonstrated, civilian response jurisdictions have found that they can readily incorporate the CW IRP's information into their own local response plans.

### ***Accomplishments of the CW IRP***

Improving how civilian responders can deal with chemical terrorism requires addressing personal protection of responders, decontamination, and medical treatment of chemical agent victims. The CW IRP team has performed technical initiatives in each of these areas and has used the results of these initiatives to develop improved guidance and methods of dealing with chemical terrorism. The SBCCOM cannot, and does not, dictate emergency response requirements and procedures. However, with the participation of its civilian emergency response partners, the CW IRP team provides improved response guidance and methods to the emergency response community as a whole. Each separate jurisdiction of the emergency response community holds the authority to adopt or reject the CW IRP's improved response guidance and methods. To date, the guidance and methods have helped many jurisdictions develop emergency response procedures that can maintain the safety of the emergency responders while minimizing the impact of chemical

terrorism and maximizing the effectiveness of emergency-response assets.

For decontamination of chemical agent victims, the CW IRP team has examined previous research reports and studies on the removal of chemical agent from the skin and found that rinsing with large amounts of plain water is the best way that firefighters can most rapidly decontaminate chemical agent victims. The CW IRP team has developed guidance on how firefighters can use their fire-fighting equipment to decontaminate large numbers of chemical agent victims quickly.<sup>5</sup> Fire rescue personnel were recognized as likely to encounter chemical agent vapors during early response to a chemical terrorism event, and it was initially not known whether or not brief vapor exposures would be highly lethal to firefighters using normal personal protective equipment (PPE), including a self-contained breathing apparatus. This uncertainty threatened a fundamental firefighter mission—saving lives by rapid reaction.

The CW IRP tested firefighters' PPE and determined how much protection the equipment offers when it is in use. Using this information, the CW IRP team demonstrated that firefighters could arrive on scene and proceed with reconnaissance and rescue, with known and minimal risk of any significant chemical agent effects.<sup>6</sup> The CW IRP team showed how firefighters can use positive-pressure ventilation fans to further reduce the risk associated with

rescue in an enclosed space containing chemical agent vapors.<sup>7</sup> Firefighters often use positive-pressure ventilation fans to remove dangerous gases from buildings. The CW IRP team demonstrated that these techniques and procedures apply equally well to chemical agent contamination.

### *On-Going Initiatives*

The CW IRP team is currently working with the Maryland State Police Special Weapons and Tactics Teams to perform, for law enforcement personnel, PPE assessments similar to those that have helped fire departments. This work will show the levels of protection that law enforcement personnel will receive from various PPE systems. More importantly, these analyses will assess the risk of receiving chemical agent symptoms from various law enforcement missions with chemical PPE in chemically contaminated environments. This information will allow law enforcement personnel to match their PPE configurations and their mission activities so they can effectively manage the risks of potential chemical threats.

With outstanding support from Baltimore, the CW IRP team is developing the operational plans for an off-site triage treatment and transportation center (OST3C) to provide medical care of chemical victims. The OST3C plan is designed to keep contamination out of existing medical facilities. The CW IRP team and Baltimore are developing structural and operational plans for an OST3C and will be exercising those plans

soon. An OST3C will help the community deal with large numbers of chemical victims, without dangerously contaminating and having to close its valuable medical facilities. Once decontaminated and given initial medical care at the OST3C, more severe chemical victims can be safely moved to existing medical facilities.

The CW IRP team is also continuing to develop guidance on handling fatalities that might be caused by chemical terrorism, and what follow-on medical care and handling would be needed for victims who suffered acute exposure to chemical agents. These efforts will help medical examiners safely and effectively deal with chemical fatalities and will better help the medical profession deal with people who may have been exposed to chemical agents.

For biological events, the BW IRP team plans to continue to validate and improve selected components of the BW response template through tests and exercises. The team planned and executed a functional test of the template's casualty care function in November 1999. In addition to demonstrating the concept's applied validity, the test helped determine more definitive staffing and facility requirements for casualty care during a BW incident.

The BW IRP team analyzed the overall structure of the BW response template to identify the key decisions that public officials will have to make to respond effectively to a biological threat.<sup>8</sup> The response template was

evaluated as a total, integrated response system in three national regions. The regions were of varying populations and geographically dispersed, including Kansas, Florida, and Delaware. These evaluations provided feedback on the general applicability of the template and indicated how it could be adapted to various localities in different regions and with different population bases.

In addition, the team helped identify useful "triggers" or "flags" that could guide decision makers in determining if a covert biological attack has occurred. The BW IRP team also conducted a follow-on workshop with the Federal Bureau of Investigation, local law enforcement representatives, and members of the public health community to assess the nuances associated with criminal investigation for a bioterrorist incident. A full workshop report is forthcoming and will be placed on the SBCCOM Web site at <http://www.dp.sbccom.army.mil/>.

Finally, the BW IRP team continues to assess response improvement concepts. Specifically, the team is working to develop chemical and biological building protection measures, biodecontamination techniques and protocols, subway biosurveillance technologies, emergency response management software, and biocasualty projection methods to assist civilian emergency managers in assessing the consequences of a bioterrorist attack.

Reports referenced in this article and all other technical reports of

both the CW IRP's and the BW IRP's analyses can be found at SBCCOM's Internet Web site.

### ***Conclusions***

In a relatively short period of time, the IRP has begun to provide civilian emergency managers and first responders a logical, conceptual framework that they can use as a starting point to improve their overall preparedness for responding to domestic CB terrorist incidents. Using the IRP, first responders have been able to identify actual response problems and design solutions that work in the real world. Solutions emphasized in the IRP are based on equipment and know how already possessed by the first responders. Through follow-on activities of the IRP, these initial-response concepts will be both validated and improved.

The IRP response concepts will also be extrapolated and applied to the requirements of military installation responders and response units. From experience, the military has learned that being prepared to defend against CB warfare is the most effective deterrent to such warfare itself. The efforts of the IRP will never eliminate all CB terrorist threats. However, it is hoped that preparedness to defend ourselves against this kind of terrorism will lead terrorists to realize that their desired ends will not be achieved because our emergency responders are prepared and capable of effectively dealing with such incidents.

In addition to providing these tangible benefits to our nation's civilian- and military-based communities, the IRP highlights another important fact: The Army's research and development centers are a valuable national resource that can provide broad-based benefits beyond the military community. The successes of the IRP specifically underscore how Army scientists and engineers can effectively partner with federal agencies as diverse as the Federal Bureau of Investigation, the Federal Emergency Management Agency, the Department of Health and Human Services, the Environmental Protection Agency, and the U.S. Department of Agriculture. Indeed, through the IRP, SBCCOM engineers and scientists have worked side by side with state and local representatives in functional specialties spanning law enforcement, hazardous spill management, firefighting, and emergency medical services. Considering the organizational and practical benefits of such partnerships, the SBCCOM feels privileged to continue working on this critical national effort.

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### ***Endnotes***

<sup>1</sup>Centers for Disease Control and Prevention, "Biological and Chemical Terrorism: Strategic Plan for Preparedness and Response," April 21, 2000, Vol. 49, No. RR-4, 3.

<sup>2</sup> Ibid.

<sup>3</sup>SBCCOM, "Biological Weapons Improved Response Program (BW IRP) Executive Summary," March 1999. Available: <http://dp.sbccom.army.mil>

<sup>4</sup>A more detailed description of the BW response template and its response components can be found in SBCCOM's "Improving Local and State Agency Response to Terrorist Incidents Involving Biological Weapons – Interim Planning Guide," August 1999. Available: <http://dp.sbccom.army.mil/>

<sup>5</sup>SBCCOM, "Guidelines for Mass Casualty Decontamination During a Terrorist Chemical Agent Incident," January 2000. Available: <http://dp.sbccom.army.mil/>

<sup>6</sup>SBCCOM, "Guidelines for Incident Commander's Use of Firefighter Protective Ensemble (FFPE) with Self-Contained Breathing Apparatus (SCBA) for Rescue Operations During a Terrorist Chemical Agent Incident," August 1999. Available: <http://dp.sbccom.army.mil>

<sup>7</sup>SBCCOM, "Use of Positive Pressure Ventilation (PPV) Fans to Reduce the Hazards of Entering Chemically Contaminated Buildings," July 1999. Available: <http://dp.sbccom.army.mil>

<sup>8</sup>SBCCOM, "Biological Weapons Improved Response Program (BW IRP) Response Decision Tree Workshop," August 1999. Available: <http://dp.sbccom.army.mil>

***Biographical Notes:***

Dr. Mohamed Athher Mughal has held a variety of technical and programmatic positions in the SBCCOM. Currently, he is a participant of SBCCOM's IRP. He holds a B.S. degree in chemical engineering from the University of Maryland at College Park; an M.S. degree in engineering management from the University of Maryland University College; and a Ph.D. degree in public policy from the University of Maryland at Baltimore County. Dr. Mughal is also a branch-qualified Army chemical officer and is an honor graduate of the U.S. Army Chemical School's Officers Basic Course.

Dr. Paul D. Fedele is a senior scientist with the SBCCOM. Currently, he is a senior scientific advisor with the Domestic Preparedness Chemical Weapons IRP. Dr. Fedele has a B.S. degree in physics from the University of Rochester, Rochester, New York, and M.S. and Ph.D. degrees in physics from Lehigh University, Bethlehem, Pennsylvania. His previous positions include working at the U.S. Army Chemical Systems Laboratory, Edgewood, Maryland; manager of research and operational studies in fluid dynamics and the motion of aerosols and vapors; and an international exchange scientist for

the United Kingdom (UK) Ministry of Defence, where he worked with the UK Defence Research and Evaluation Agency at the Chemical Biological Defence Establishment, Porton Down, England.

# IMPROVED TOXICOLOGICAL AGENT PROTECTIVE ENSEMBLE (ITAP)

## *Better protection against toxic chemicals*

by Curt Biberdorf

**B**etter protection against toxic chemicals along with greater user comfort will be offered with the Improved Toxicological Agent Protective ensemble.

The ensemble, known as “ITAP,” will replace the M3 Toxicological Agent Protective suit that was the military’s standard protection for almost 40 years.

The state-of-the-art suit was developed by the U.S. Army Soldier and Biological Chemical Command under the management of Project Manager-Soldier at Fort Belvoir, VA, for Army Technical Escort Unit and Chemical Activity/Depot personnel.

“The existing (M3) suit used old technology,” said Matt Whipple, an engineer who worked on the ITAP. “We upgraded the existing materials and provided additional protection.” The Occupational Safety and Health Administration and Environmental Protection Agency rate the ITAP at Level B

protection, which is capable of providing up to one hour of skin and respiratory protection.

The ensemble will be employed during war or in peacetime in immediately dangerous to life and health toxic chemical environments, emergency life-saving response, incident response, routine chemical activity

operations and initial entry monitoring. In cases that require Level A protection, the Self-contained Toxic Environment Protective Outfit (STEPO) is used. “It’s a splash suit. You don’t need total encapsulation because the users don’t expect to encounter vapors, although the new suit is sealed much better,” Whipple said.

A one-piece suit, Self-Contained Breathing Apparatus (SCBA), Personal Ice Cooling System (PICS) and Compact Air Supply System (CASS) when a filtered mode is required, compose the ITAP ensemble.

One major improvement is the one-piece garment with integral boots, front fastener closure and glove assembly. It has a splash-proof zipper with closure in the upper portion of the body, a splash hood and an over vest to cover the breathing system.

“The TAP coveralls are merely that. They used duct tape to seal off the ankles and ends of the sleeves,” said Larry Gossage, Chief of the Chemical Support Division at Pine Bluff Chemical Activity, AR.



*Improved Toxicological Agent Protective Suit*

The suit is a modified commercial item made of five alternating layers of Nomex and Teflon. The second layer of the encapsulating suit is orange, so the users can visually tell if the suit is deteriorating, said Whipple. The material provides up to one hour of protection against chemical warfare agents, industrial chemicals, petroleum, oils and lubricants. It dissipates static charges, is self-extinguishing and flame-resistant, and its light-gray color reduces its solar load for improved user comfort.

The suit's impermeable material is desirable for protection, but it builds heat inside quickly. To increase operator comfort, all suits include the PICS.

The PICS removes heat from the user's body with a closed-loop cooling system that uses ice-cold water as a coolant. Water is circulated through tubing that runs throughout the PICS cooling garment. The system provides about 30 minutes of cooling, depending on the air temperature and individual. The PICS consists of a pump unit, plastic bottle, connecting hose and tubing, suit pass-through and a shirt with tubing running throughout.

The PICS can be used longer if the ice bottle is changed periodically and can be switched in a contaminated environment. It's powered with three D-cell batteries and all together weighs about 15 pounds.

"We currently use a passive system," Gossage said. "Ice packs put into pockets of the suit are freezing cold at first. Then after

45 minutes, they've lost their cooling and become dead weight. The PICS provides a consistent, continuous cooling."

The suit is modularly designed and can be configured in the CASS or SCBA mode to meet mission needs. M3 TAP gloves, M2A1 TAP boots and M40 masks are carried over from the old suit.

The SCBA is used when the suit is configured for Level B assignments. The apparatus is approved by the National Institute for Occupational Safety and Health and is used by Army and Air Force firefighters.

It consists of a 60-minute air cylinder, breathing valve, pressure gauge, connective hose and tubing, shoulder harness and waist belt. The SCBA is worn over the ITAP suit and weighs about 35 pounds. It will be used as an alternative to the CASS when a higher level of respiratory protection is required than is provided by a filtered air mode.

The CASS is a small, lightweight unit providing a continuous flow of clean, filtered air for breathing. The system is designed for use with the standard M40 mask used for nuclear, biological, and chemical respiratory protection. The U.S. Army Soldier and Biological Chemical Command developed the CASS blower unit for aviation use and adapted the technology for the ITAP suits. The CASS filters air by maintaining positive pressure and airflow to the mask and suit.

"Two canisters provide airflow to the mask so that it's easier to

breathe and supply a pressure to the suit so that in case of a small leak, the user won't be exposed to contamination," Whipple said. "In case the seal is broken in the suit or mask, outside air is not drawn in."

The ITAP suit uses a commercial communication system available with the SCBA. Whipple said that users talked to each other with hand signals or by speaking louder through their masks with the old system.

For Level B use, the ITAP is composed of a splash suit, splash hood, over vest, boots, gloves, breathing apparatus, a communication system and cooling system. For Level C protection, the splash suit, boots, gloves, M40 mask, CASS and PICS are worn.

Level B threats consist of liquids with moderate to high toxicity and vapors with high respiratory and low skin toxicity. The potential conditions in Level C are low to moderate toxicity with liquids and low respiratory and skin toxicity with vapors.

"Level B could be when there's a short-term cleanup of a leak, while in Level C we don't anticipate any exposure to chemicals," Gossage said. "For a longer cleanup or when the situation's more dangerous, we would use the STEPO."

Maintenance will be performed primarily at the user level. The suit is capable of being decontaminated at least five times, two hours per use (or one hour under immediate danger to life and health conditions), after vapor or particulate contamination. After

liquid contamination, the suit will be decontaminated and held for disposal.

Initial fielding may begin as early as 2001 and continue with a total of 4,000 suits issued by 2003, according to Frank Cole, Logistics Manager for ITAP at the Logistics Support Activity in Redstone Arsenal, AL.

The goal is to have the ITAP suit available to complete the Congressionally-mandated chemical munitions stockpile destruction by 2007, said Marie Jean-Pierre, ITAP Project Engineer.

For additional information, please contact the Public Affairs Office at Natick, Commercial (508) 233-4300, DSN 256-4300.



*ITAP Suit decontamination*

# JOINT SERVICE LIGHTWEIGHT INTEGRATED SUIT TECHNOLOGY (JSLIST)

## *New chemical biological protective suits ready to issue*

by Curt Biberdorf

**N**ew chemical and biological agent protective suits will soon be issued to soldiers, replacing the current clothing no longer in production.

Procurement of the JSLIST overgarment began in 1997 and will be released from the war reserve to Army units as the Battledress Overgarment (BDO) supply is being depleted. Fielding will continue through 2005.

The JSLIST resulted from a joint program led by the Marine Corps to develop an overgarment to be worn in all environments when under imminent threat of a chemical or biological attack and after these operations have started. It replaces three types of chemical and biological protective suits used by the services.

The project followed as a result of a Congressional mandate that all future research, development, and procurement for all chemical items be jointly managed.

“The military wanted to make a joint program for the sake of economy,” said George Costas, Project Engineer for Product Manager-Soldier Equipment at the U.S. Army Soldier and Chemical

Biological Command. “Commonality will save money through the economy of scale.”

Some of the features of the JSLIST should also further cut costs. The wear life is 45 days for the JSLIST compared to 22 days for the BDO. Service life extends from 30 days for the BDO to 120 days for the JSLIST.



Both provide 24 hours of protection after exposure to a chemical agent, and it's expected that the JSLIST will have at least the same shelf life as the BDO.

Servicemembers will find many reasons to like the JSLIST. The JSLIST is about one pound lighter and, when packaged, is 60 percent less bulky than the BDO. JSLIST suits feel cooler and can be washed six times while the BDO cannot be washed.

“You sweat like crazy in these things,” Costas said. “It can be a pretty miserable existence to wear it until the end of its wear life.”

Another major improvement is the charcoal liner. The BDO liner is a charcoal-impregnated polyurethane foam and nylon tricot laminate. The JSLIST liner consists of a non-woven front laminated to activated carbon spheres and bonded to a knitted back that absorbs chemical agents. The BDO foam deteriorated as the wearer rubbed against the foam, and it could become messy.

“Black carbon dust would come out of the foam and get on you and your uniform. The JSLIST carbon is bonded in the liner,” Costas said. “No matter how much or how hard you rub against it, when you remove the suit, you're nice and clean.”

Depending on the temperature and mission, the overgarment may be worn over the standard duty

uniform, underwear, or over or under cold weather garments.

The JSLIST consists of a coat and trousers. The pants have expandable pockets, adjustable suspenders and adjustable waistband. They also have a front zipper opening with a protective flap, and a bellows pocket with flap located on each thigh. Each leg opening has Velcro ankle adjustment tabs.

The waist-length coat has an integral hood, a zipper covered by a flap that is fastened with Velcro, enclosed extendable elastic drawcord hem with jacket retention cord, full-length sleeves with Velcro wrist closure adjustment tabs, and an outside expandable pocket with flap on the left sleeve. The outer shell of both pieces is a 50 percent cotton and 50 percent

nylon poplin ripstop fabric with a durable water-repellent finish. The material is more flexible and can breathe without losing any protection, Costas said. The suits are available in woodland and desert camouflage patterns.

“It’s tailored much better. We have done many studies and field tests to make sure it fits well,” Costas said.

JSLIST suits are stored in vacuum-sealed packages. They are offered in seven sizes and have the advantage of being split-issue, allowing service members to mix a large coat with extra large pants for example.

“With all the body types, you get a more comfortable fit and better chemical protection because it fits them properly,” Costas said.

Although the Department of Defense is in the process of destroying their chemical weapons stockpiles, other countries and terrorists have the potential to use chemical weapons, which is why the chemical protective suit remains an important item in the inventory, Costas said. With an improved pattern established, advances to the suit will focus on making the material lighter, cooler and safer.

For additional information, please contact the Public Affairs Office at Natick, Commercial (508) 233-4300 or DSN 256-4300.

# JOINT SERVICE GENERAL PURPOSE MASK

## *Program continues at a fast pace*

by John Maruscak

With the award of the Program Definition Risk Reduction contract to Avon Rubber and Plastics, Inc. of Cadillac, MI, just a mere 5 months earlier, the contractor held the concept review meeting at SBCCOM in September. In his opening and welcoming remarks to the audience of over 80 government and contractor personnel, COL Steve Reeves, the Project Manager for NBC Defense Systems and lead materiel developer for this joint service protective mask program, stated that in terms of a development program the progress made has been remarkable. The contractor has been able to progress from the Award to the Start of Work to the Pre-Concept Review to the Concept Review, while maintaining the proposed schedule and costs.

The three concept prototypes that were displayed on the table represented the culmination of much research and years of experience and corporate information exchanged since award of the contract and additional compatibility testing conducted under the partnership agreement signed at the Start of Work meeting. The partnership agreements were appropriately framed and presented to the Joint



Service representatives and the Avon Team representatives at the Concept Review. The presentation was more than ceremonial since the prototypes developed for the meeting were working models that featured new ideas resulting from the exchange of ideas and information and data about the joint service's experience and operational scenarios the services have had on current mask systems and the expectations they have for the new mask.

Consolidating all this information and exploiting the best features of the best were the results of the teaming and partnering arrangement between the Government and contractor teams in the time between award of contract and this concept review meeting.

It is our belief that it is through this cooperative arrangement that the contract has kept within cost and schedule while maintaining this fast pace. Continuing this cooperation will be essential for all of us to keep this program on track to a successful completion. The next major contractual program event is the Concept Baseline Review scheduled for May 2001.



For additional information, please contact Mr. John Maruscak, Commercial (410) 436-6541, DSN 584-6541 or email [john.maruscak@sbccom.apgea.army.mil](mailto:john.maruscak@sbccom.apgea.army.mil)

# LIGHTWEIGHT DECONTAMINATION SYSTEM (LDS)

## *Meeting the U.S. Marine Corps' **One Fuel Forward** Operating Parameters*

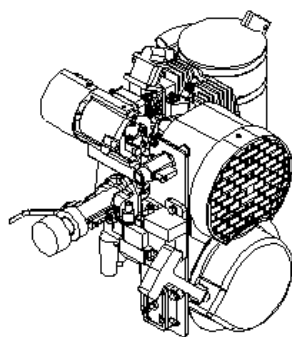
**T**he SBCCOM-RI Decontamination Team has culminated a 16-month effort in conjunction with the U.S. Marine Corps to develop and procure 1,224 modification kits to enable the U.S. Army-managed M17 LDS to operate on JP 5/8 Fuels. This allows the Marine Corps to meet the requirement of their **One Fuel Forward** operating parameters.

The Marine Corps is modifying all their existing M17s by installing new motors and conversion kits to allow the system to operate on diesel fuels. This will significantly reduce the logistical footprint for fuel management in a *dirty* battlefield environment.

The engine was developed by 2SI Corp., of Beaufort, SC. This same company made the two-cycle engines that are the main power source of the existing M17 LDS.

The new engine was developed for applications that require powerful lightweight engines fueled by diesel fuel or other heavy fuels. The unique 2SI engine is a low-compression, lightweight, industrial-duty engine of 215 cc displacement that delivers 8 hp at 4,250 rpm. It uses spark plugs for ignition rather than high-compression ignition. The new engine uses a patented mechanical direct-injection fuel delivery system that is licensed from the Italian firm of Piaggio. The new injector fuel delivery system is able to pressurize and atomize the heavy fuels to facilitate easy starting and operation on diesel fuels at a very low compression rate of 5.8 to 1.

The mechanical direct-injection fuel delivery system also uses a two-cycle oil injector system to feed lubrication oil to the two-cycle motor for lubrication. The oil injection system runs on a pint of lube oil for every 5 gallons of engine fuel. The oil is in a separate tank and is fed to the engine separately and not mixed with the fuel.



MARINE CORPS  
HEAVY FUEL ENGINE

A manual recoil starter is used for starting the new engine. A centrifugal clutch drives the combustion air fan, water pump, and heater fuel pump of the LDS. The entire system produces 36 Vac to power the systems electronics via a step-down transformer. A standard NATO slave cable adapter was added to the system to allow the new engine to preheat for cold weather assisted starts. Reliable performance was documented to -10 EF. Fuel consumption is approximately 0.6 gal per hour. The entire LDS retrofit package added only 24 extra pounds to the complete system, which was more than acceptable for the Marine Corps' lightweight requirement. The new engine uses over 50% of the same common parts as are on the present two-cycle system, which reduces logistical and maintenance requirements.

Extensive performance and endurance tests were introduced to

the new engine design on test stands and in operational LDSs by the contractor and Army engineers and Marine Corps users and technical advisors. Over 1,500 hours of documented run time was accumulated on the engines confirming user confidence in reliability and operation. Testing at the Aberdeen Proving Ground's Climate Test Chambers confirmed extreme hot/cold capabilities and reliability of operation.

The modification is done at the Marine Corps' equivalent to the Army's Direct Support and can be accomplished in 7-8 hours. This contract was a joint effort of the Marine Corps, SBCCOM-RI, and the TACOM-RI contracting team using alpha contracting to provide a quick and efficient program that met the Marine Corps' urgent time requirements.

For additional information, please contact Mr. Nick DeBolt, SBCCOM-RI, at DSN 793-1696, or by email to [deboltn@ria.army.mil](mailto:deboltn@ria.army.mil)

# JOINT SERVICE SENSITIVE EQUIPMENT DECONTAMINATION

## *Decontaminate CB agents on sensitive equipment*

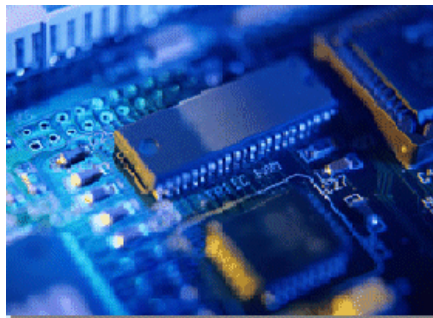
**T**he Joint Service Sensitive Equipment Decontamination (JSSED) Joint Operational Requirements Document (JORD) was derived from the Joint DOD Mission Needs Statement for NBC Defense, dated 16 July 1999. The JSSED JORD was published by the Joint Service Integration Group (JSIG), and a sensitive equipment decontamination capability is a documented high priority for the warfighter. Two key performance parameters are identified in the JSSED JORD:

- Decontamination of all sensitive equipment and aircraft/vehicle interiors “on-the-move” without affecting service life or operations, and

- JSSED system operations compatible with all other aircraft/vehicle/ship servicing tasks, including refueling, rearming, and other decontamination operations.

**System Overview.** The JSSED system(s) will provide the ability to decontaminate chemical and biological agents on sensitive equipment (avionics, electronics, electrical, and environmental systems and equipment), aircraft/vehicle interiors (during flight/ground/shipboard operations), and associated cargo.

SBCCOM/ECBC is the lead acquisition agency for this program. In order to fully assess the efficacy and feasibility of proposed decontamination technologies, JSSED performed a technology assessment to investigate candidate technologies from industry and other defense programs. Decontamination of sensitive equipment, aircraft/vehicle interiors, and associated cargo has been broken down into three distinct capabilities. The dissection of JSSED capabilities into the following three, progressively increasing capability “blocks” will significantly reduce technology and financial risk, making the development and production process of these capabilities more realistic: **Block I, Block II, and Block III.**



The **Block I** system will address the ability to successfully decontaminate sensitive equipment without affecting operational readiness, reliability, or maintainability. Sensitive

equipment includes electronics, avionics, environmental control systems, and life-support systems. Based on the technology assessment performed, a transportable, re-circulating solvent wash sonicated bath system to decontaminate sensitive equipment items with potential use as a parts cleaning system was determined most favorable for this application. As advertised in the Commerce Business Daily, the **Draft Performance Specification** for the Joint Service Sensitive Equipment Decontamination (JSSED) Block I is available. For additional information on the Performance Specification, contact Mr. Douglas A. Cunningham by email (douglas.cunningham@sbccom.apgea.army.mil), by telephone at (410) 436-7619 or DSN 584-7619, or by fax to (410) 436-1383.

The **Draft Statement of Work (SOW)** is also available. For additional information on the Draft SOW, contact Mr. Thomas E. Witkowski by email (thomas.witkowski@sbccom.apgea.army.mil) or by telephone at (410) 436-5672 or DSN 584-5672.

**Key Events:** Block I Milestone I - 1QFY01

The **Block II** system will address the ability to decontaminate the interiors of aircraft/vehicles requiring unique volumetric processing for all aircraft/vehicles current or planned for U.S. inventory.



Also, chemical and biological agents may penetrate porous materials, presenting residual agent off-gassing problems requiring periodic decontamination. Based on the technology assessment, the proposed Block II system solution would use high-output air heaters to produce the necessary temperature elevation and air-flow needed to facilitate thermal desorption for long-duration, in-place interior decontamination.

**Key Events:** Block II/III Milestone I - 1QFY04

The **Block III** system will address the ability to decontaminate aircraft and vehicle interiors during flight, ground, or shipboard operations also known as decontamination “on-the-move.”



This decontamination system/process will provide on-demand decontamination without adverse effects on crew, mission, or platform performance. Based on the technology assessment performed, the most feasible solution for Block III systems to date are spot decontamination “kits” for sensitive equipment and interiors which incorporate solvent wash and sorbent decontamination components. These “kits” would include one or more solvents compatible with electronics and sensitive materials for the dissolution of agent contamination, and sorbent decontamination materials for the removal of the dissolved agent from the surface.

For additional information, please contact the Product Manager- Obscuration and Decontamination Systems, ATTN: AMSSB-PM-RNN-OJ/Mr. Adolfo Negrón, Aberdeen Proving Ground, MD 21010-5424. Mr. Negrón can also be contacted by email to [adolfo.negron@sbccom.apgea.army.mil](mailto:adolfo.negron@sbccom.apgea.army.mil), or by telephone at (410) 436-5529 or DSN 584-5529.

# VALUE ENGINEERING WORKSHOP

*Value engineering is a structured approach to reviewing a system, item, or process to determine if the item or process could be redesigned to perform its functions at a reduced cost.*

*by Kenneth Rice, Contributing Writer*

Experts from across the U.S. Army Soldier and Biological Chemical Command reviewed fielded items to develop cost-saving ideas during its first value engineering workshop in June in Edgewood, MD.

Participants from the Edgewood Chemical Biological Center (ECBC), Product Manager-Soldier Support, Project Manager-Nuclear Biological and Chemical Defense Systems, Natick Soldier Center, Integrated Materiel Management Center (IMMC)-Rock Island, IL; and Pine Bluff Arsenal, AR; reviewed four items representing important aspects of each item's life cycle. They examined management, logistics, packaging and production (contractors).

Value engineering is a structured approach to reviewing a system, item, or process that begins with a functional analysis, which is a review of what functions the item, system or process is required to perform. The analysis can determine if the item or process could be redesigned to perform these functions at a reduced cost.

Normally, the process evolves into narrowing the focus to the highest payoff functions with the best chance for success. This idea was the driver for the workshop. Value engineering has been receiving increased attention in the Army as it looks to reduce life cycle costs as a way to help fund modernization.

**The process normally evolves into narrowing the focus to the highest payoff functions with the best chance for success. This idea was the driver for the workshop. Value engineering has been receiving increased attention in the Army as it looks to reduce life-cycle costs as a way to help fund modernization.**

The teams looked at the required functions of the items, analyzing which functions were critical to their use, and choosing aspects of these items that would best benefit from cost-saving concepts. Each item posed individual challenges, and proposed solutions were as different as the items under study by the teams.

"This approach went well beyond the traditional value engineering mindset where contractors are

encouraged to submit value engineering change proposals in hope that someday they might be implemented," said Mr. Michael Parker, SBCCOM's Deputy Commander. "The conference took a very expansive view of value engineering, considering everything in the life cycle."

Four items were reviewed:

- M295 decontamination kit.

The M295 decontamination kit fits over the hand like a mitt and contains a decontamination powder pouch in the palm area. The kit is used for decontaminating field equipment that has been exposed to a chemical agent attack. Although the original design fully meets the



requirements, it is expensive and labor intensive to manufacture. A team representing Pine Bluff Arsenal (one of two M295 production facilities), the project officer from ECBC, the IMMC-Rock Island, and

command's operations and support cost reduction manager developed several options to reduce costs.

Four proposed modifications were eliminating the center heat seal seam, squaring the mitt corners, eliminating a Velcro strap and eliminating the unit pack box. If successful, a total of \$157,000 per year will be saved.

- C2A1 canister

The C2A1 canister houses the filter for many of the newer protective masks. The filter assembly screws onto the mask systems. The current configuration uses old metal canning technology and opens up with a key similar to a sardine can. The manufacturing process is expensive and represents a high percentage of the total cost of the filtration system.



A team consisting of IMMC-Rock Island, an ECBC packaging specialist and the contractor, 3M Canada, proposed several packaging solutions to reduce costs. One example solution replaces the can with a less expensive tri-laminate bag while adding an inexpensive cap and plug to protect the filter's fragile screw threads.

Another option with even greater potential savings calls for employing two bags to improve the vapor seal while simultaneously eliminating the need for a cap and plug all together. With the current

four-year contract and production requirements of 900,000 canisters, the projected savings range from \$1.1 million to \$1.26 million depending on which option is ultimately chosen.

- Laundry system

The Laundry Advanced System (LADS) is the Army's new water-based mobile field laundry. The LADS is comprised of laundry processing and water recycling equipment. A team consisting of PM-Soldier Support, the command's value engineering manager and the contractor, Guild Associates, looked at high value system issues such as training, water storage, fuel pod and water pump.



The recommendations ranged from process changes to increase system accountability in the field to contract changes to allow the prime contractor to procure the water storage tank, water pump and fuel pod currently procured by Defense Logistics Agency (DLA). The latter proposal would eliminate surcharges and potentially yield significant savings from volume discounts available to the contractor for bulk purchases. Potential savings from implementing the value engineering changes are estimated at \$280,000 for 140 systems.

- Chemical agent monitor

The Chemical Agent Monitor (CAM)/Improved Chemical Agent Monitor (ICAM) is a hand-held, soldier-operated post-attack device for monitoring chemical agent contamination on personnel and equipment. The monitor detects and discriminates between vapors of nerve and mustard agents. The CAM/ICAM team consisted of PM-NBC representatives, an NSC representative and the U.S. Army Materiel Command value



engineering manager. The team determined that the most critical issue concerning the item was readiness.

The team used results of a recent field survey which identified that the lack of proper field maintenance was compromising system operation. The new ICAMs will be fielded to units with CAMs. The displaced CAMs will be moved to other units but will require significant and expensive repairs since most are not in operational condition. Three options were proposed to minimize costs and most effectively solve these issues, from a total upgrade of the existing CAMs to make them into lower maintenance ICAMs to proposing that no CAMs be cascaded, thereby saving significant projected repair costs.

Maj. Gen. John Doesburg,  
SBCCOM Commander, and

COL Steve Reeves, PM-NBC Defense Systems, attended the out briefs on June 9<sup>th</sup>. Doesburg and Reeves said they were impressed with the results of the workshop.

The command's value engineering manager will communicate with each team at the workshop to ensure that the proposed changes are implemented. Furthermore, site visits will be arranged to conduct follow-up mini value engineering workshops to reach those who did not attend this workshop and revisit projects to determine what savings were actually realized.

These site visits will also serve to reinforce the concept of institutionalizing value engineering into the command's processes. For FY01, the goal is to review 10 systems for value engineering savings potential.

A second full-scale value engineering workshop is planned for FY01 at Natick, similar to the one at Edgewood, providing the opportunity for greater participation from the product managers and NSC, which are located at Natick, MA.

By instituting a value engineering program at SBCCOM, significant cost savings can be realized.


Editor's note: Kenneth Rice is the Supplemental Programs Team leader at Natick Soldier Center's Operations and Customer Interface Directorate.

For additional information, please contact the Public Affairs Office at Natick, Commercial (508) 233-4300, DSN 256-4300.

# FIELDINGS

 <p><i>M56 Smoke Generator</i></p>	<p>National Training Center, Ft. Irwin, CA</p> <p>POC: Randal H. Loiland AMSSB-PM-RSM-M, DSN 584-2806</p>	<p>Jan 01</p>
 <p><i>M58 Smoke Generator</i></p>	<p>APS 3, Goose Creek, SC</p> <p>POC: Peter F. Annunziato AMSSB-PM-RSM, DSN 584-2362</p>	<p>Jul 01</p>
 <p><i>M157A2 MWO</i></p>	<p>Las Vegas, NV Boston, MA</p> <p>POC: Peter F. Annunziato AMSSB-PM-RSM, DSN 584-2362</p>	<p>Mar 01 Jun 01</p>
 <p><i>M157A1 Smoke Generator</i></p>	<p>53<sup>rd</sup> Brigade, FLNG, Tampa, FL 92<sup>nd</sup> Brigade, Puerto Rico NG, Salinas, PR 355<sup>th</sup> Company, Reserves, Las Vegas, NV 11<sup>th</sup> ACR, NTC, Ft. Irwin, CA OPS Group, NTC, Ft. Irwin, CA 401<sup>st</sup> Company, Reserves, Boston, MA</p> <p>POC: Richard Dixon AMSSB-RSO-SM (RI), DSN 793-7153</p>	<p>Jan - Feb 01 Feb 01 Mar 01 Mar 01 Mar 01 Jun 01</p>

 <p><i>Light Vehicle Obscuration Smoke System (LVOSS)</i></p>	<p>18<sup>th</sup> Engr Brigade, IBCT, Ft. Lewis, WA  MP Systems, Ft. Campbell, KY  Infantry Systems, Ft. Bragg, NC  MP Systems, Ft. Polk, LA  194<sup>th</sup> MP Co., Ft. Campbell, KY  MP Systems, Ft. Carson, CO  4<sup>th</sup> MP Co., Ft. Hood, TX  978<sup>th</sup> MP Co., Ft. Bliss, TX  21<sup>st</sup> ID Infantry and MP units, 8<sup>th</sup> MP Brigade  MP Units, Korea  511<sup>th</sup> MP Co., Ft. Drum, NY  988<sup>th</sup> MP Co., Ft. Benning, GA</p> <p>POC: Henry St.Pierre  AMSSB-PM-RSM-R, DSN 584-5527</p>	<p>Dec 00  Dec 00  Jan 01  Mar 01  Apr 01  May 01  May 01  May 01  Jun-Jul 01</p> <p>Jun 01  Jun 01</p>
 <p><i>Driver's Vehicle Enhancement</i></p>	<p>Chemical School, Ft. Leonard Wood, MO</p> <p>POC: Randal H. Loiland  AMSSB-PM-RSM-M, DSN 584-2806</p>	<p>Jun 01</p>
 <p><i>M37 Mid-Size Riot Control Disperser</i></p>	<p>USAEUR (Germany)  FORSCOM  EUSA (Korea)</p> <p>POC: Robert Carestia  AMSSB-REN-ES, DSN: 584-5595</p>	<p>Dec 00  Jan 01  Feb 01</p>
 <p><i>M17A3 Lightweight Decon</i></p>	<p>Korea  Japan</p> <p>POC: Dan Liedtke  AMSSB-RSO-DTM (RI), DSN 793-6822</p>	<p>Apr - May 01  Apr - May 01</p>

 <p><i>Improved Chemical Agent Monitor</i></p>	<p>Ft. Carson, CO Korea USARC FP1 USARPAC (JA, AK, HI) Ft. Irwin, CA</p> <p>POC: CPT Scott Morris AMSSB-PM-RNN-T, DSN 584-6551</p>	<p>Jan 01 Feb 01 Mar 01 Apr 01 May 01</p>
 <p><i>M93A1 FOX</i></p>	<p>69<sup>th</sup> Cml Co., 1<sup>st</sup> AD, Hanau, GE</p> <p>POC: CPT Scott Morris AMSSB-PM-RNN-T, DSN 584-6551</p>	<p>Mar 01</p>
 <p><i>M45 Aircrew CB Protective Mask</i></p>	<p>Ft. Carson, CO</p> <p>POC: CPT Scott Morris AMSSB-PM-RNN-M, DSN 584-6551</p>	<p>Jan 01</p>
 <p><i>M22 Automatic Chemical Agent Alarm</i></p>	<p>Ft. Stewart, Hunter AAF, GA Ft. Carson, CO Ft. Bragg, NC Ft. Hood, TX</p> <p>POC: CPT Scott Morris AMSSB-PM-RNN-A, DSN 584-6551</p>	<p>Jan 01 Mar 01 May 01 Jun 01</p>

# THE CHEMICAL DEFENSIVE EQUIPMENT GO-TO-WAR PROGRAM

## *Two years of successful execution*

*by Bob Ratcliff*

**I**n 1997 the Chief of Staff, Army (CSA), performed a Chemical Defense Equipment (CDE) readiness review. The review revealed discrepancies in the CDE stockage system. This review resulted in the development of a multi-year solution to address the issue and was dubbed the Army Chemical Defensive Equipment Go-To-War (CDE GTW) Program.

The Go-to-War Program directed a standardized individual CDE basic load that would provide the soldier with the basic chemical and biological protection needed for initial deployment. There are 11 items: seven from U.S. Army Soldier and Biological Chemical Command (SBCCOM) managed equipment and four from the Defense Logistics Agency (DLA). The CDE GTW items managed by SBCCOM are the M9 Detector Paper, M8 Detector Paper, M256 Detector Kit, M291 Skin and M295 Equipment Decontamination Kits, C2A1 Filters, and M40/M42 Hoods. DLA items are Chemical Protective Helmet Covers, Battle Dress Overgarments, and Chemical Protective Gloves and Overshoes.

Stockage of this CDE equipment at either installation or depot is based on unit deployment timelines.

Force Package (FP) 1, Force Support Package (FSP) 1, and all USASOC units will maintain 100% of their CDE basic load on their installation. OCONUS forces will maintain 100% of their CDE basic load in theater. CONUS FP2, FP3, FSP2, RC USASOC, Enhanced Separate Brigades, and other CS/CSS support elements' CDE basic load is maintained by AMC and issued when directed by HQ DA.

The role of SBCCOM in this program is two fold. SBCCOM is the full life-cycle manager for the first seven items on this list, and therefore manages and acquires these items for all the Armed Services. Secondly, SBCCOM is the manager of the CDE GTW Program stockpile that is maintained within AMC. The principal responsibility for these functions resides with the SBCCOM element located at Rock Island Arsenal, IL. The CDE GTW stockpile is stored and maintained by Blue Grass Army Depot, KY.

Funds to purchase the CDE GTW stocks are provided from the chemical Training Resource Model (TRM). This funding is part of a unit's indirect OPTEMPO expenses. FP1, FSP1, and OCONUS units will expend their

annual CDE TRM allocations each year on CDE. HQ DA directs a portion of the chemical TRM allocation for CONUS FP2, FP3, FSP2, Reserve Component USASOC, Enhanced Separate Brigades, and other CS/CSS support elements to HQ AMC. SBCCOM uses these funds to purchase and manage these CDE stocks. The TRM will continue to provide these units with money to purchase NBC training items.

An ownership code paired with the project code (DF3) in the materiel management computer system in CCSS keeps the CDE GTW assets separated from issueable stock. The status of the program is available on the SBCCOM sector of the Army Electronic Product Support system via the World Wide Web.

Readiness reporting is done in terms of Brigade Sets defined for CDE GTW program purposes as 4,200 soldiers. The on-hand CDE item quantities and number of issueable Brigade Sets are reported monthly at the AMC Mid-Month Readiness Review.

The CDE stockpile program is a multi-year effort with a goal of achieving 42 Brigade Sets by FY07. In total, approximately

170,000 soldiers will be equipped through the CDE stockpile efforts. After FY07, the focus of the program will shift to sustaining the 42 Brigade Sets by ensuring the equipment is in the latest configuration and replacing deployed equipment.

Through the end of FY00, the CDE GTW program has achieved its second year goal of having 11 Brigade Sets ready to issue.

There has already been 13 DA directed deployments from the CDE GTW stockpile ranging in size from 5 to 1,100 soldiers. The program has been very successful in accomplishing the Chief of Staff's mission to ensure that our combat and combat support troops have the necessary equipment on-hand to fight and win in a chemical/biological environment.

For additional information, please contact Mr. William R. Ratcliff, SBCCOM-RI, DSN 793-0374, or email to RatcliffW@ria.army.mil

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## END ITEM UPDATES

### NBC DEFENSE EQUIPMENT

#### *Reconnaissance, Detection, and Identification –*

*Chemical Biological Aerosol Warning System (CBAWS)* – The CBAWS completed support to the Air Force - Force Protection Battlelab Joint Expeditionary Force Experiment 2000. The primary focus of the Battlelab's initiative was to demonstrate an improved Command and Control node to include both physical security and CB detection and warning. SBCCOM supported this effort by providing and supporting the CBAWS along with several other standard detection/warning devices. CBAWS interface ability was successfully demonstrated into their higher level Command and Control architecture. The data is processed and displayed on digital maps that are customized to meet the needs of the various end users of the information. The exercise was deemed a major success.

*M34A1 Sampling Kit* – The SBCCOM Rock Island Detection/Decon Team, in association with TACOM - Rock Island, recently awarded a five-year requirements contract for the M34A1 Sampling Kit to Truetech Inc., of New York. This is a new and totally redesigned sampling kit based on a performance specification and replaces the old M34 Soil Sampling Kit. The M34A1 is used for the collection of soil, surface, and liquid samples that may contain chemical agent contaminants. These samples are sent to a laboratory for analysis.

*Commodity License* – The application for the Nuclear Regulatory Commission (NRC) license for the CAD, CAM, ICAM, and ACADA to accept the transfer of mission from TACOM-RI was approved by the NRC in October. License No. 19-30563-01 places the responsibility for the license management of these devices with SBCCOM.

#### *Individual Protection –*

*M48 Chemical Biological Apache Aviator Mask* – Members of the Mask Core Team and the Computer Aided Engineering Team met with representatives of the PM Apache at Fort Rucker, AL, to demonstrate four prototype-mounting brackets for the M48 Lightweight Motor Blower. PM Apache representatives evaluated the four prototypes. Emergency egress and maintainability were critical factors evaluated. From these criteria one prototype was selected for further development and testing. A new optimal hose length from the blower to the facepiece was also determined at the meeting.

*M40/42 Series Mask* – In response to a Maintenance Advisory Message, the M40 Team has received requests for approximately 1,700 nose cup valve seats. These are being used as spare parts until the replacement nose cup valve seat is in production. Replacement precludes the need to replace the entire facepiece at a savings to the user of over \$50 per facepiece.

#### *Collective Protection –*

*M28 Collective Protective Equipment (CPE)* – Using the existing M28 CPE long term contract with Production Products MFG (PPMS), SBCCOM (RI), we are procuring over 200 Filter Elements for field replacements. Since PPMS has produced Filter Elements within the last year for a Natick contract, the First Article (FA) requirement was waived. Waiving the FA will reduce the delivery time of the FA by 180 days. Filter Elements should now be delivered by 1 January 2001.

*200 CFM Gas and Particulate Filter Unit* – An Engineering Change Proposal to change the current packaging of the unit from expensive throw away packaging to a more affordable reusable packaging design is planned for completion early in January 2001. SBCCOM (Rock Island and Edgewood) and Pine Bluff

Arsenal are working together on the completion of this project. The projected unit cost savings from this project

is approximately \$50. The major user of this filter is the Navy.

## OBSCURATION AND DECONTAMINATION SYSTEMS

### *Obscuration –*

*Smoke Generating Systems, M56* – A Commerce Business Daily notice appeared on September 15<sup>th</sup> to alert potential bidders of the planned issue date of the request for proposal for the M56 production follow-on contract. The proposal is located at

<https://abop.monmouth.army.mil>

We also have a link to the web site from our home page at <http://www.sbccom.apgea.army.mil/RDA/pmsmk/index.htm>

*Smoke Generating Systems, M56 and M58 –*

- In August, a Supply Management Army - Operating and Support Cost Reduction (SMA-OSCR) proposal was approved, entitled “Fault Diagnosis Box for M56/M58 Smoke Generators.” The proposal introduces a new diagnostic tool - a fault diagnosis box, which is designed to reduce the cost of maintaining the M56 and M58 systems and to eliminate false removal of components. Implementation of this initiative will begin immediately, and units will begin receiving the fault diagnosis box 4QFY01.

- In September, a contract was awarded to Titan DBA Systems of Mel Bourne, FL. The \$17.9M contract is a development effort to provide Millimeter Wave Obscuration Capability for the M56 and M58 Smoke Generating Systems.

*M157A2 Maintenance Trainers* – The Ordnance Center & School (OC&S) funded PM for Obscuration and Decontamination Systems to convert three M157A2 maintenance trainers to include fault insertion boxes. OC&S currently has one fault insertion box, which simulates parts failures to improve troubleshooting training. The conversions are scheduled for completion in Dec 00.

*M6 Discharger* – Industrial Machining and Design Services (IMDS) successfully completed The First Article Test (FAT). IMDS was awarded an 8a contract for production of 1,878 each M6 Dischargers in April. An abbreviated in-house Production Verification Test using the FAT items was initiated in September. The PVT results will support a December 2000 New Material Release. The M6 (98 each) will be fielded to 14 Heavy Assault Bridge vehicles in December at Fort Hood.

*L96A1 and L97A1 Grenades* – Production funding was received to build the L96A1 and L97A1 grenades for the Army Non-Lethal Capability Sets. The Acquisition Decision Memorandum for Milestone III (28 Mar 00) approved Type Classification of the XL96E1 and XL97E1 following receipt of production funding. Accordingly, a Material Status Record denoting Type Classification will be submitted to AMC.

### *Decontamination –*

*M291 Decontamination Kit* – In September, members of the Detection/Decon Kits team, SBCCOM(RI), met with representatives of Rohm & Haas Co. (R&H) and Truetech, Inc., to discuss production of resins used to make the decontaminating powder (XE-555) for the M291 Kit. Rohm & Haas stated in writing that they do not want to continue making all the resins listed in a 10-year licensing agreement they have with the Government. During the meeting, we explained to R&H that we will need XE-555 resin for several more years, even after the agreement expires on 31 Dec 02. The XE-555 resin is the Army’s only decontaminant approved for use on skin. It is blended by Truetech, Inc., from constituents that are proprietary to R&H. We are partnering with R&H to resolve this issue in a manner that is agreeable to both parties.

*M295 Decontamination Kits* – First Article Test (FAT) is complete and low rate production of M295 Decon Kits has started at Pine Bluff Arsenal (PBA). Initial inconsistencies in sorbent reactivity test results caused concern over packaging, storing, and handling of sorbent

powder for the M295 Decon Kit. A joint effort between engineers from ECBC, the Integrated Materiel Management Center at Rock Island, representatives from Guild Associates, and PBA engineers led to modifications of sorbent powder handling and filling stations to ensure more consistent reactivity characteristics. The group effort also resulted in a better turn-around time and lowered the costs for performing the test. Additional improvements to the production process have been initiated and should be completed first quarter FY01.

DS2 – Mission reassignment for a Seneca DS2 Enclave from OSC to SBCCOM has been accomplished according to AMC Permanent Order 158-9 (as amended). The Enclave will store, ship, receive, maintain and dispose of the Army DS2 stockpile located at the Seneca Army Depot Activity (BRAC), Romulus, NY. The Enclave mission will be accomplished by the

### **SBCCOM-RI MODIFICATION WORK ORDER TEAM**

The Modification Work Order (MWO) Team from SBCCOM-RI has been fulfilling customer maintenance and sustainment requirements, including completing a 4-year modification effort to the M1059 Smoke Generator Carrier. Last September, a team was sent to Ft. Wainwright, AK, to provide technical expertise and training to the 122nd Separate Infantry Brigade.

The team trained eleven operators and nine maintainers, as well as the SBCCOM LAR. The unit received equipment in worse condition than expected. SBCCOM-RI provided a limited quantity of spare parts to the unit, and with the repairs suggested and parts provided, saved the unit over \$6.5K. The LAR in Alaska wrote, “the quick reaction to assist and the high degree of professionalism exhibited by the individual team members resulted in a positive image of SBCCOM at the highest USARAK levels of command.”

The MWO Team has also applied the M157A2 Smoke Generator Set (SGS) MWO to 30 systems for the National Guard. Six of these systems were actually fielded to the INARNG in September 2000. The INARNG

Edgewood Chemical Activity of SBCCOM with four on-site employees. The successful transition of the Enclave resulted from the cooperative efforts of AMC, OSC, SBCCOM and the SEDA caretaker staff.

*M17 Lightweight Decontamination System* – After intensive testing and user evaluation, TACOM-RI, in conjunction with SBCCOM, awarded the production option for heavy fuel engine kits to 2 Stroke International (formerly AMW Cuyuna). This lightweight 2-cycle multi-fuel engine kit will replace the gasoline 2-cycle engine in the Marine Corps’ M17 Decon Systems and modify the heater/burner to operate on JP-5/8 as primary fuels. This project achieves the single fuel forward requirement for the Marine Corps’ M17 Decon Systems (see article on page 23).

provided HMMWVS, and SBCCOM-RI provided the M157A2 SGS systems, including fog oil pump and air compressor assemblies from previously displaced equipment. The other 24 systems were upgraded from M157 systems for the VAARNG in October 2000. During the VAARNG application, four fog oil pumps were repaired. This action saved the unit over \$6,900.

Also in September, six M1059 Smoke Generator Carrier systems were upgraded from M157 to M157A2 SGS equipment. In addition, six M1059s were upgraded for the MSARNG in November. These upgrades were the last M1059 vehicles to receive the M1059 MWO. The complete fleet of M1059 Smoke Generator Carrier vehicles have the latest version of the M157 series Smoke Generators.

The total savings, to the individual units, for these efforts were over \$13,000. In addition, the training that the units received was deemed exceptional. Many of the units expressed their thanks to SBCCOM-RI for the efforts of their MWO team. The effort to complete additional upgraded fieldings of the M157 series Smoke Generators will continue throughout 2000.

## TECHNICAL ADVISORY MESSAGE #101

### Replacement of P-D-680 Solvents

(a) APC Technical Advisory Message #88, 121800z Aug 96, Use of Unauthorized Cleaning Solvent

(b) APC Technical Advisory MESSAGE #92, Substitutes for P-D-680, Dry Cleaning and Degreasing Solvent

1. Reference Msg (a) Identified a problem with the use of unauthorized and untested solvents being procured. The msg (a) also cautioned that using these untested solvents for parts cleaning of weapons, ground vehicles/equipment and aircraft could result in problems with incompatibility, inadequate cleaning, hydrogen embrittlement and corrosion related problems that will impact readiness. Reference msg (b) identified environmentally compliant solvents (ECS) as the substitute for P-D-680 Solvents.

2. Currently, the P-D-680 Solvents except for Type III were defined as toxic substance, flammable material, hazardous waste, and air pollutant. To replace these P-D-680 Solvents, a study was conducted through DOD field demonstrations. Several candidate solvents were found as the replacement of P-D-680 Solvents. As a tri-service effort, P-D-680 Specification has been revised and superceded with MIL-PRF- 680, Degreasing Solvent. The MIL-PRF-680 Specification covers four types of hydrocarbon solvents. Especially, Type IV is a new solvent and contains d-limomene additive. All MIL-PRF- 680 Solvents are non-toxic, not listed under any EPA toxic/hazardous classification, recyclable and give performance fully equivalent to the P-A-680 Solvents. As a result, P-D-680 Specification was replaced with MIL-PRF-680.

3. All procurement of MIL-PRF-680 Solvents must use the following NSNs. These NSNs were assigned to MIL-PRF-680 Solvents.

TYPE I 6850-01-474-2302 1 GAL 6850-01-474-2309 5 GAL 6850-01-474-2313 55 GAL	TYPE III 6850-01-474-2318 1 GAL 6850-01-474-2320 5 GAL 6850-01-474-2321 55 GAL
TYPE II 6850-01-474-2319 1 GAL 6850-01-474-2317 5 GAL 6850-01-474-2317 55 GAL	TYPE IV 6850-01-472-2723 1 PT 6850-01-472-272 11 QT 6850-01-472-2722 1 GAL 6850-01-472-2717 5 GAL 6850-01-472-2718 55 GAL

4. The P-D-680 Solvents are no longer recommended for part cleaning applications due to their toxicity. However, if P-D- 680 Solvents are currently in stock, users can continue to use them with caution until depleted. Any new solvent procurement must refer to MIL-PRF-680 Solvents. There is no alternative/substitute for MIL-PRF-680 Solvents.

5. POC at the Army Petroleum Center is Ms. Cathy Freeman at DSN 977-5868, Comm 717-770-5868. POC at TARDEC is Dr. In-Sik Rhee DSN 786-4218, Comm 810-574-4218.

## **SAFETY MESSAGE**

Please read the safety message pertaining to the potential hazard using the Two-Point Seatbelt in the HMMWV's. Provided below the safety message are the correct procedures for use of the Two-Point Seatbelt extracted from the TM Operator's Manual (referenced in the Safety Message).

\*\*\*\*\* WARNING \*\*\*\*\*

1. Recently the Army experienced a tragic accident involving a variation of the high mobility multi-purpose wheeled vehicle (HMMWV) family of vehicles. This vehicle used a two-point seatbelt restraint system common to older versions of the HMMWV. What makes this accident especially tragic is that the driver of the vehicle was wearing his seatbelt during the course of the accident. Unfortunately, he was not wearing it correctly.
2. The Army recognized a significant hazard associated with the standard two-point seatbelt restraint system in the HMMWV. While the seatbelt is retractable, it does not contain an inertial stopping device that most civilian vehicles have as standard equipment. This means that the user must remove all slack from the retractor and tighten the seatbelt snug across the body. Instructions on proper wear of the seatbelt and warnings about the hazards associated with this seatbelt are posted in TM 9-2320-280-10.
3. The two-point seatbelt system is currently being phased out. Modification work order 9-2320-280-35-2, dated 1Jun 96, outlines the procedures for installation of the three-point seatbelt restraint system for basic versions of the HMMWV. Until completion of these modifications, commanders should do the following:
  - a. Warn personnel of the hazards associated with the two-point seatbelt restraint system.
  - b. Train personnel on the correct procedures for use of the two-point seatbelt restraint system.
  - c. Rigidly enforce the requirements of AR 385-55 for mandatory seatbelt use in all vehicles so equipped.
4. Additionally, commanders should review maintenance and inspection procedures for all vehicles containing the two-point seatbelt restraint system. Ensure all warnings are posted (on the vehicle and in applicable TMs) and adhered to during all types of operations.

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## **ENGINEERING DATA MANAGEMENT SYSTEM IMPROVEMENT**

As part of the continuous process to improve the Engineering Data Management System, a new feature was added to the Technical Data Package List (TDPL) generation process. At that part in the process that a TDPL text file is generated for review, an HTML version of the TDPL is also being generated. In the HTML version of the TDPL, the documents listed on the TDPL that SBCCOM has in its electronic vault are linked to the document files in the electronic vault. If a user wants to view an SBCCOM document listed on the HTML TDPL, the user double clicks on the link in the HTML TDPL and the document will be downloaded to that user's workstation for viewing.

## HELP LINES/TOLL-FREE NUMBERS

	<i>Telephone No.</i>	<i>fax no.</i>
Chemical Maintenance	Germany 0130810280 Korea 0078-14-800-0335 CONUS 1-800-831-4408	1-410-436-3912 (TOLL CALL)
Obscuration/Decontamination	1-888-246-1013	1-410-436-2702 (TOLL CALL)
Environmental Quality	1-410-436-6588 (TOLL CALL)	1-410-436-8484 (TOLL CALL)
Operational Forces Interface Group (OFIG)	1-508-233-5341 (TOLL CALL) DSN 256-5341	

# SAVE THE DATE...

## June 12 and 13, 2001

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 410.278.1267



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 APG Science & Technology Board  
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## BRIEFS

**FY01 ARMY ACQUISITION POLLUTION PREVENTION (P2) PROJECT.** The Mask Core Team received approval of a proposal under the Army P2 mission to reduce/eliminate pollution in manufacturing of military clothing and textiles. The project will research and implement a heat activated low Volatile Organic Compound (VOC) for seam bonding of NBC Protective Garments. The project was approved for \$310K over a 2-year period. Phase one will consist of a market survey of current state-of-the-art low VOC adhesives and processes which can be applied to butyl coated Nylon and other fabrics in the manufacture of protective clothing. Phase two will include test and evaluation of candidate adhesives against Army performance specifications for protective clothing.

**SUPPORT TO DEPARTMENT OF JUSTICE AND HOMELAND DEFENSE.** Through an Interagency Agreement (IAA), the Edgewood Center continues to support the Department of Justice's (DOJ) Center for Domestic Preparedness located in Anniston, AL. The agreement, signed by SBCCOM's Technical Director and Office of Justice Programs' (OJP) Assistant Attorney General, provides DOJ with the CB expertise required to operate a federal live agent chemical training center instructing first responders in emergency response and Weapons of Mass Destruction (WMD). This training center, once called the Chemical Decontamination Training Facility (CDTF) and owned/operated by the U.S. Army Chemical School, is now owned by the DOJ and has been renamed the Chemical Ordnance Biological and Radiological Training Facility (COBRATF). The Chemical School's CDTF has relocated. During the first week in October, the DOJ Training Facility was inspected by the U.S. Army Inspector General in areas to include safety, security, surety, and emergency response. The inspection team found a chemical agent facility that is managed and operated to the highest standards required to protect employees, the chemical agent, the facilities, and the local community. The excellent inspection results are a testimony to the professionalism, knowledge, and motivation of the COBRATF personnel

and reflect, in a very positive way, the outstanding support provided by SBCCOM. Staff.

**EDGEWOOD TEAM JOINS HIGH-LEVEL ARCHITECTURE FEDERATION.** Our Modeling and Simulation Team successfully completed performance and compliance testing for AMC's High-Level Architecture (HLA) Federation. We developed the requisite technologies to contribute real-time CB and sensor modeling capabilities. Using the DoD-mandated HLA simulation protocols, this Federation represents the first consortium within AMC to attain the connectivity and interoperability to perform both constructive and virtual simulations over high-speed, long-haul networks. During November exercises, the Team demonstrated collaborative communications capabilities as well as modeling of interactive, semi-automated forces in a multicast network environment. Future plans will incorporate more robust scenarios involving CB sensors and fielded entities under the AMC Real-Time Platform Federation Object Model being developed under AMC auspices.

**TRANSGENIC PRODUCTION OF BIODETECTION REAGENTS.** In collaboration with scientists from Gala Design, Inc., scientists of the Molecular Engineering Team have engineered mammalian cell lines to produce recombinant antibodies against the threat agents botulinum toxin and Yersinia pestis (plague). Also, several transgenic cows, engineered to produce antibodies in their milk, are in gestation. Recombinant antibodies produced and purified from cows' milk, cell cultures, and bacterial fermentations have the advantages of being producible in large quantities, resulting in better quality control and significant cost savings over the traditional methods used to produce these defense-critical reagents. Recombinant antibody production in bacteria and transgenic mammalian cells and animals are examples of the powerful applications of biotechnology being applied at ECBC to accomplish the biological defense mission.

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## PARTNERING

### COOPERATIVE R&D WITH INDUSTRY AND ACADEMIA

**R**ecent significant achievements and actions in our continuing commitment to *technology transfer* follow:

In October, SBCCOM was notified by Headquarters, Department of the Army Staff that an Army Lab/Center Reinvention Waiver, of DA's review of Cooperative Research and Development Agreements (CRADAs) and Patent Licensing Agreements (PLAs), was granted. CRADAs and PLAs can be executed and immediately implemented without the 30 day delay for review by the Army Domestic Technology Transfer Program Manager and staff.

#### ***Testing Services Agreement (TSA)***

The Technology Transfer office executed three TSAs in September with Mine Safety Appliances Company, CamelBak Products, Inc., and BAE Systems. These TSAs are for agent testing of materials and equipment; combined revenue to ECBC labs is \$160,000.

A tentative agreement has been established with the University of Rochester, Center for Optical Manufacturing (COM) to work optical machining and polishing

issues for mask development. The COM developed automated technologies for microgrinding and optical polishing of complex surfaces such as the non-uniform surface envisioned for the Joint Services General Purpose Mask. This relationship should improve lens tool development. A trip was made in October to refine plans, acquaint the COM with Simula Technologies, and assess other possible collaborations.

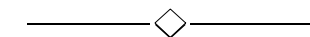
Also, TSAs with Environmental Technologies Group and Ion Track Technology were signed in which the Applied Chemistry Team will be testing developmental detectors with agent.

#### ***Patents***

Dr. Raef Tadros, a Chemical Engineer with the Directorate of Engineering and Technology at Pine Bluff Arsenal (PBA) has been granted a patent for his invention in the field of degradable polyesters. The patent, issued September 19, 2000, concerns forming a mixed culture of microorganisms with a wide capability of metabolizing a variety of polyesters. The degradable polyesters are used in packaging, packing, agricultural, biomedical, and other applications. This issuance marks his second patent. Dr. Tadros is project

engineer for the development of the 120mm Terephthalic Acid (TA) Smoke Mortar Cartridge and is currently working on an alternative biodegradable binder for the TA smoke mix.

POC: Office of Research and Technology Applications, DSN 584-4438, commercial (410) 436-4438, email address is techt@sbccom.apgea.army.mil



#### **TECHNICAL INDUSTRIAL LIAISON**

##### ***CB Defense Advance Planning Brief to Industry***

In September, SBCCOM hosted 400 industry representatives at this annual event that included two full days of presentations covering the entire Joint Service Chemical Biological Defense program. Dr. Jay Davis, Director of the Defense Threat Reduction Agency, served as the keynote speaker. Other key participants included Dr. Anna Johnson-Winegar, Deputy Assistant to the Secretary of Defense for CB Defense, and MG John Doesburg, Commander of SBCCOM and Chairman of the Joint Service Materiel Group. The agenda covered emerging military requirements, future development

and production of CB defense materiel, medical CB defense, chemical demilitarization, domestic preparedness, and the Department of Energy's Nonproliferation Program. You may review the presentations given at the APBI at the following site:

[www.sbccom.apgea.army.mil/RDA/apbi/index.htm](http://www.sbccom.apgea.army.mil/RDA/apbi/index.htm)

During the IR&D Conference, which followed the APBI, 25 companies presented their internally-funded programs to panels of government experts. Each presentation was given to one of four panels addressing the areas of Point Detection, Standoff Detection, Protection, and Decontamination.

### ***Small Business Innovation Research (SBIR)***

#### ***Phase I Proposals:***

We received 53 proposals as a result of the 00.2 SBIR Solicitation on four separate topics. Those proposals were evaluated using the SBIR's on-line system. Those proposals recommended for funding were forwarded to the SBIR Technology Area Chief for CB Defense. Based upon his recommendations, the Army selected the following proposals for contract:

- (1) Combinatorial Synthesis and Screening of Sensing Nanomaterial for Warfare Agents
- (2) Nontoxic Biodegradable Nanomaterials and Biomaterials Signature Reduction

(3) Non-toxic Nanomaterials for Obscurant Applications

(4) Stabilization of Enzymes for the Destruction of Toxic Materials and Chemical Agents

(5) Hand-Held Chemical Threat Monitor for the Soldier System

(6) Compact, Lightweight, Low-Cost, Permanently-Aligned Infrared Spectrometers.

#### ***Recent Phase II Contract Awards:***

CombiMatrix Corporation, Burlingame, CA: to develop immobilization chemistries that will enable a microchip to be used for the detection of chemical and biological agents. Phase I demonstrated the ability to selectively immobilize antibodies and other reagents onto the microchip. Phase II will further refine the technology. This approach will result in significant reductions in instrumentation costs and increased portability.

Institute for Laser Technology (ILT), Rancho Palos Verdes, CA: to develop a compact, robust wavelength tuner. This tuner is the most critical component of the Manportable CB Standoff Sensor, which is also being developed by ILT under a separate Phase II contract.

Syagen Technology, Tustin, CA: to develop a manportable, rapid screening gas chromatography/mass spectrometry system. This system is a unique candidate for consideration in the military's requirement for a lightweight (30 pounds plus 10-pound battery

pack) CB detector/identification system with high sensitivity. The system would also have application to chemical demilitarization testing, nonproliferation stockpile assessments, environmental hazardous materials testing, law-enforcement utility, and air quality monitoring.

#### ***Phase II Proposals:***

#### **Other Recent Phase II Awards:**

(1) Tera Biotechnology, San Diego, CA, to develop an automated system to screen phage antibody libraries by a parallel selection process which would allow routine generation of antibodies of any specificity without the need of human intervention. Such an automated system would lower the risk to personnel and generate considerable cost savings.

(2) TPL, Albuquerque, NM, to develop a multi-site DNA sensing biosensor platform with sufficient sensitivity to avoid DNA amplification.

#### **More Phase II Selections:**

In addition, the following eight Phase II proposals were selected by the Army for contract award. Contract negotiations are commencing.

- (1) Low-cost Rugged Upward Looking IR Ground Sensor
- (2) Nanosensor – a Fully Automated Microfabrication-Based Biodetector
- (3) Low-Cost, Microfabrication-Based Biodetection

(4) Microfluidic Biodetection System for Personnel Monitoring

(5) High-Pulse-Rate IR Source for Improved DIAL Sensitivity

(6) An Advanced SERS Water Monitor for CB Analytes

(7) Handheld Real-Time Chemical Biological Agent Water Monitor

(8) Field-Deployable Chemical Point Detection Network

### **DOD SBIR Solicitation 01.1**

This solicitation opened in October and closes January 10<sup>th</sup>, 2001. The CB Defense section of the solicitation will have the following Army topics:

(1) Lightweight Microarray Field Unit for Rapid Physiological Analysis of Army Personnel (ARL)

(2) Mass Customization Biomanufacturing Process (ECBC)

(3) Optimized OPO Converter for Solid State Standoff CB Sensors (ECBC)

(4) Adhesively Bonded Electrospun Membranes for Protective Clothing (NSC)

(5) Colorimetric End-of-Service Life Indicator for Mask Filters (ARO)

(6) Super-Efficient, Low Toxicity, Dendrimer-Quaternary Ammonium Compound Biocides (ARL)

### **Broad Agency Announcement**

We recently updated the Edgewood BAA, which is available on SBCCOM's worldwide web site, to BAA 2001. Paragraphs addressing Collective Protection, Respiratory Protection, and Decontamination were added. The BAA provides a mechanism for industry to present new technologies and concepts to the Edgewood technical staff.

For additional information on the Technical Industrial Liaison Office at Edgewood, please contact Mr. Ronald P. Hinkle, AMSSB-RAS-C, Commercial (410) 436-2031 or DSN 584-2031.

## PATENTS

During the past year, the following patents were awarded to Edgewood CB Center employees.

(1) Patent number 6,158,429 entitled “**Respirator for Protection Against Biological Hazards**” issued December 12, 2000, to Paul D. Gardner and Linda C. Strickler. The present invention pertains to an air purifying masks, particulate respiratory protective devices for use in contaminated military and civilian environments. It has a hood capable of enclosing the head and neck of a human user; at least one HEPA filter extending through the hood; at least one transparent lens positioned at the level of the eyes of the user; and a breathe through airflow assembly.

(2) Patent number 6,132,356 entitled “**Portable System for Vapor, Aerosol or Airborne Hazard Suppression of Hazardous Environmental Spills**” issued October 17, 2000, to Paul G. Schabdach and James A. Genovese. This invention pertains to a portable apparatus for quickly containing and suppressing localized hazardous material spills, including biological, chemical or radiological particulates until rigorous clean-up or other more permanent containment means can be employed.

(3) Patent number 6,080,566 entitled “**Enzymatic Detoxification of Organophosphorous Compounds**” issued June 27, 2000, to Tu-Chen Cheng and Joseph J. DeFrank. This invention relates to the expression of a recombinant bacterial enzyme which is useful for detoxifying cholinesterase-inhibiting organophosphorus compounds such as pesticides and chemical nerve agents and the decontamination of substances contaminated with these compounds.

(4) Patent number 6,076,671 entitled “**Solid Particle Aerosol Belt and Dissemination Method**” issued June 20, 2000, to Raymond J. Malecki, William G. Rouse, Michael J. Orr, Daniel J. Hartman, Samuel Morgan. This invention relates to a solid particle aerosol device and method which provide easy handling and dissemination of the solid particle aerosol material. The device and method permit the rapid and efficient dissemination of solid particle aerosol into the atmosphere for military and civilian purposes.

(5) Patent number 6,076,710 entitled “**Infrared Mueller Matrix Detection and Ranging System**” issued May 9, 2000, to Arthur H. Carrieri, Jerold R. Bottiger, David J. Owens, and Erik S. Roese. The present invention identifies chemical and/or biological materials (CBMs) at a distance by interrogating the materials with infrared laser light. The device and method interrogate CBMs with modulated polarized infrared laser light, collect backscattered polarized infrared laser radiation, electronically record the information from the collected polarized infrared radiation, and mathematically analyze the information to identify the CBMs. Additionally, the device and method may determine the distance to the CBMs.

(6) Patent number 6,054,310 entitled “**Continuous Fed-Batch Degradation of Decontaminating Solution 2 (DS2)**” issued April 25, 2000, to Michael H. Kim and Joseph J. DeFrank. The present invention is a continuous process for biodegradation of an amine compound and a composition useful in that process. The process and composition allow for the degradation of amine compounds that are environmentally toxic, especially chemical compounds containing DETA such as DS2.

(7) Patent number 6,051,189 entitled “**System and Method for Detection, Identification and Monitoring of Submicron-Sized Particles**” issued April 18, 2000, to Charles H. Wick and David Anderson. The present invention pertains to a device and method for automated detection, identification, and monitoring which samples submicron size particles. Preferable, the present invention provides for the sampling, detection and identification of viruses and virus-like agents (such as, for example prions, viral subunits, viral cores of delipidated viruses, etc.) in bioaerosols and fluids, especially biological fluids.

(8) Patent number 6,047,644 entitled “**Propellant Based Aerosol Generating Device and Method of Use**” issued April 11, 2000, to Raymond J. Malecki, William G. Rouse, Daniel J. Hartman, Samuel Morgan, and Tom Mills. The present invention relates to a device used for aerosol dispersal and a method of aerosol dispersal using the device. The aerosol dispersal device and method permit easy handling and dissemination of the aerosols in combat and non-combat operations, and provide a rapid and efficient method for dispersal of aerosols into the atmosphere for military and civilian purposes. The device

is a pyrotechnic which does not depend on explosive means such as high explosives, nor pneumatic means such as vehicle “bleed air” for proper functioning.

(9) Patent number 6,017,750 entitled “**Hydrolysis and Biodegradation of the Chemical Warfare Vesicant Agent HT**” issued January 25, 2000, to Steven P. Harvey, Linda L. Szafraniec and William T. Beaudry. The present invention relates to a process for the detoxification or demilitarization of the chemical warfare agent HT. The process comprises the steps of treating HT with a hydrolyzing agent to form a mixture of thiodiglycol (TDG) and bis-(2-(2-hydroxy ethylthio)ethyl) ether (T-OH); neutralizing the

TDG and T-OH mixture to a pH which is sufficient for allowing biodegradation of the mixture to occur; and biodegrading the neutralized TDG and T-OH mixture into a demilitarized biomass and effluent.

For additional information, please contact Vicki Upchurch, DSN 584-1291, commercial (410) 436-1291, or by email to [vicki.upchurch@sbccom.apgea.army.mil](mailto:vicki.upchurch@sbccom.apgea.army.mil)

## INTERNATIONAL COOPERATIVE R&D

### *The Technical Cooperation Program (TTCP)*

<http://www.ttcp.osd.mil>

### *Data Exchange Annex (DEA) Annual Reports*

Dr. George Famini visited several South Korean Defense Agencies in Seoul and Taejon in October. In Seoul, a visit was made to the Defense Quality Assurance Agency (DQAA) and the Korean Arms Verification Agency (KAVA). At DQAA, discussions were held under the auspices of DEA A-DEA-64-KS-1001 at the request of Mr. Gerald Dersch, US TPO on Military Rations and Food, in an effort to re-invigorate this DEA. Although DQAA expressed interest in several areas, they provide no specific details. Dr. Yee (the KS TPO) indicated he would forward a briefing on their food R&D program in order to identify areas for cooperative exchange. At KAVA, a visit was made to MG Jang Jeong Ho and Dr. Kim Suk Chan. MG Jang has recently taken over as director of KAVA, which is involved with treaty verification (to include both the CWC and the BTWC) and destruction of the South Korean CWA stockpile. In Taejon, accompanied by Dr David Tevault, US TPO, both the Agency for Defense Development (ADD) and the ROK TRADOC HQ were

visited. At ADD, discussions were held under A-DEA-73-KS-1173 on CBR Systems and Equipment, as well as topics for future DEAs. The U.S. discussed the desire to cooperate in ballistic protection research, but ADD indicated they had no program in this area to exchange data. ADD did recommend investigation of establishing a DEA relative to integrated soldier systems. This proposal will be taken back to the Warrior Systems Group at Natick to determine interest and possible benefit.

### **Project Agreements**

A Swedish delegation consisting of Mr. Lars Sandstrom and Dr. Rune Berglind of FOA met with Dr. George Famini and Dr. Ron Checkai in October to negotiate the final details of the joint Project Agreement on Environmental Toxicology of Chemical Warfare Agents. It is expected that the process will be completed by the end of March 2001, with signatures by MG von Kaenal and BG Linstrom at the next U.S./SW Senior National Representatives - Army meeting in April 2001.

### *Engineer and Scientist Exchange Program*

Dr. Kil-Sang Yoo began his 1-year assignment at SBCCOM in November under the US/KS

Engineer and Scientist Exchange Program. Dr. Yoo is working with Mr. Ray Jablonski and will be addressing several research problems in modeling and simulation.

### **Visits**

MAJ Masayuki Akiyama from the Japanese Ground Staff Office and LTC Koichi Katsura from the Japanese Liaison Offices, visited SBCCOM/ECBC. They received briefings on Joint Biological Point Detection System, the PDF, and the CAD/CAM capabilities as well as overviews from PM NBC Defense Systems, Research and Technology and Engineering Directorates and the CSEPP program. MAJ Akiyama's visit to the United States also included the Chemical School where he discussed training issues as well. This visit took place under the auspices of Data Exchange Agreement DEA-A-96-JA-1554, Detection and Decontamination of Chemical Agents and DEA-A-96-JA 1297, Protection Against Chemical Agents.

CAPT Ian Jarvis and Ms. Selena Wright, United Kingdom, visited SBCCOM/ECBC, Joint Program Office, Falls Church, VA, Dugway Proving Ground, UT, the Chemical School, Fort Leonard Wood, MS, and Natick, MA, to tour facilities, attend meetings, and discuss U.S. Acquisition and Research Programs

to establish areas of mutual interest and potential for cooperation and collaboration. The visit took place under the auspices of the U.S./UK/CA MOU on Research, Development and Acquisition of CBR Defensive Materiel.

Mr. Richard Soilleux, United Kingdom, visited SBCCOM/ECBC, to work on remediation projects. This visit took place under the auspices of the U.S./UK/CA MOU on Research Development and Acquisition of CBR Defensive Material.

Dr. Matthijs Leeuw, and three others from the Netherlands, visited SBCCOM/ECBC, to have briefings and collaborative discussions on research and development in the field of chemical and biological defense. This visit took place under the auspices of Data Exchange Agreement Number DEA-A-65-TN-1044, Defense Against Chemical Agents.

CAPT Dror Ronen and Dr. GAD Frishman, Israel visited SBCCOM/ECBC to participate in the CB Detection Conference that was held in Williamsburg, VA.

POCs: Dr. George R. Famini, (SBCCOM RDA), Commercial (410) 436-2552/5376, DSN 584-2552/5376, email [george.famini@apgea.army.mil](mailto:george.famini@apgea.army.mil); Susan Luckan (ECBC), Commercial (410) 436-5252, DSN 584-5252, email [susan.luckan@apgea.army.mil](mailto:susan.luckan@apgea.army.mil); and Tom Tassinari (NSC), Commercial (508) 233-4218.

# PM OF THE YEAR

## COL Steve Reeves receives Army honor

by Joann Brucksch

The warm Florida sun was a perfect backdrop for the special ceremony recognizing those receiving the Army's Project Manager of the Year Award, Product Manager of the Year Award, and two Acquisition Commander of the Year Awards. The recipients were recognized by Paul J. Hoeper, Assistant Secretary of the Army for Acquisition, Logistics and Technology, during the annual Army Acquisition Workshop in Orlando, FL. These awards are in recognition of outstanding achievements.

SBCCOM's COL Steve Reeves, PM NBC Defense Systems, received the Project Manager of the Year Award. He was cited for executing all of his assigned programs within budget, cost and schedule variance. COL Reeves is credited with leading his NBC defense teams in fielding more than 150,000 items of defense equipment.

COL Reeves leads multi-disciplinary integrated product teams from both core and matrix support organizations. The overwhelming success of his IPTs is due in part to the fact that he has expanded the IPT structure to include representatives from the

Joint Services materiel and combat developers, procurement, logistics and testing communities and private industry. As a result of the success of these ITPs he has been responsible for fielding 10 new systems. He is responsible for 11 joint service product lines and execution of 3 product lines for other services.

COL Reeves adopted full life-cycle management and trained his teams to manage total life-cycle costs resulting in developing and implementing numerous O&S cost reduction efforts. His innovative contracting approaches resulted in

receiving the Vice President's Hammer Award for total ownership cost reduction.

A visionary, COL Reeves developed a strategy for NBC spiral development and horizontal integration matched to the Army's digitization goals and modernization strategy. His road map to the future for all his systems will become the blueprint for all Joint NBC Defense programs. He looks beyond today, builds for the long run, and is a master at coaching and mentoring his teams to achieve real reform and excellence. Well done, COL Reeves!



*"This is a great honor for the total PM NBC Defense Systems Team. It recognizes the great work done by a truly dedicated group of acquisition professionals across the services and across the many organizations that are part of each integrated product team. That includes our project office staff, research scientists, technical and operational testers, the joint service user representatives, and our logisticians. It's really their leadership and management skills and focus on fielding the very best equipment for the joint services that is being recognized with this award."*

*COL Steve Reeves*

## PEOPLE



Dr. Harry Salem, long-time toxicologist and member of the Society of Toxicology, was selected to serve as the **2001 Congressional Science Fellow of the Society of Toxicology**. He expects to begin his service following placement in mid-January. Dr. Salem is currently Chief Scientist at the Edgewood Chemical Biological Center. He brings a wealth of credentials to the experience

including Master and Doctoral degrees in Pharmacology from the University of Toronto. He has extensive teaching experience and a lengthy list of publications. Salem has often worked with a range of federal agencies and departments and currently serves as the Department of Defense representative on the Interagency Coordinating Committee for the Validation of Alternative Methods and the Interagency Committee on Neurotoxicology. Dr. Salem is the third Fellow sponsored by the Society of Toxicology, following Brad Shurdut and Skip Matthews. The Congressional Science Fellows Program is part of an effort by the Society of Toxicology to increase its visibility in Washington and to support the use of scientific expertise in governmental decisions.

On September 27<sup>th</sup>, MG Doesburg presented **Meritorious Civilian Service Awards** to:

Mr. James Cannaliato  
Mr. Pat Berry  
Mr. Bruce Jezek

following the Deactivation Ceremony for the Program Director, Biological Defense Systems.

On Sunday evening, November 5<sup>th</sup>, SBCCOM's Volunteers for Medical Engineering (VME) Team received the VME **Team of the Year** award at the annual awards banquet, which was held in the Fire Museum of Maryland. Ms. Jan Hoffberger, VME Executive Director presented the award to Mr. Mark Schlein, technical representative, and Mr. Bob Coen, client advocate, representing the SBCCOM VME Team. Approximately

20 employees of the Edgewood Area of Aberdeen Proving Ground volunteered their time in 2000. The team has completed nine projects since its inception in December 1998.



Ms. Jan Hoffberger, Director of VME, and Mr. Robert Coen, SBCCOM VME Team Client Advocate

The Picatinny Chapter, National Defense Industrial Association will award Certificates of Recognition to Edgewood Center personnel who have made significant contributions to the successful completion of the Type Classification/Materiel Release of the M30 Tank Main Gun Simulator and the M31 Direct/Indirect Fire Cue Simulator. These personnel include Beth Hirsh, CB Services Directorate's Risk Management, Dr. Sandra Thomson and Steve Anthony, Research and Technology Directorate's Toxicology Team, and Kyle Russell and Mike Burnham, Research and Technology Directorate's Smoke Core Team. Combustion product analysis of pyrotechnically disseminated simulators needed to be performed before type classification could be granted. All of the above individuals worked together to accomplish this important goal and incorporate the results into the required Life Cycle Environmental Assessment. They supported Picatinny Arsenal project managers in meeting their program milestones.

In early November, Mr. Zarzycki, SBCCOM RDEC Technical Director, was notification by DA that the following employees were winners of an **FY00 Army**

**R&D Achievement Award.** This prestigious award is bestowed in recognition of outstanding technical achievements, which have resulted in improved U.S. Army capabilities and have contributed to the nation's welfare. The topics, winners, and a summary of their achievements follow:

1. *Nanoreactor-based Topical Skin Protectant Creams*, by Dr. H. Dupont Durst, Edgewood CB Center (ECBC); Dr. Ray Yin, U.S. Army Research Laboratory; and CPT Stephen T. Hobson, Ph.D., U.S. Army Medical Research Institute of Chemical Defense.

**Summary of Achievement:** Drs. Ray Yin, Steven Hobson, and H. Dupont Durst have been working together on the design and synthesis of nanoscale materials for potential chem/bio defense applications since early 1998. In recent years, there has been an increased awareness to the chemical and biological threats on both military personnel and civilians, sparked in part by the Gulf War. In order to increase the protection offered to warfighters, Drs. Yin, Hobson, and Durst began development of a new type of reactive topical skin protective cream. Previously, USAMRICD has developed an inert barrier cream that offers excellent protection against all chemical agents but needed to be improved against sulfur mustard vapor. A variety of reactant materials, such as microparticle adsorbants and strong oxidizers, were tested in combination with the existing cream with only moderate success. Skin irritation and incompatibility with the cream base remained. Persistent problems and the protection levels afforded were lower than desired. Very recently, however, the joint Army R&D team led by Drs. Yin, Durst, and Hobson has developed a novel approach that uses nanoscale reactors (nanoreactors) to tackle this problem. Using very carefully controlled synthetic techniques, the team produced nanosized particles whose outer surface is compatible with the chemicals in the cream formulation but whose inner surface contains chemicals that can react with mustard and nerve agents absorbed by the particles.

2. *Biological Attack Warning System* by Dr. Richard Smardzewski, Mr. David Sickenberger, Mr. Felix Reyes, Mr. J. Michael Cress, and Ms. Karen Vado, ECBC.

**Summary of Achievement:** Dr. Richard Smardzewski, Mr. David Sickenberger, Mr. Felix Reyes, Mr. Michael Cress, and Ms. Karen Vado developed a lightweight,

easily deployable Biological Attack Warning System (BAWS) using a two-tiered network of lightweight, remote, battery-powered sensors radio-linked to a briefcase-sized central base station. The equipment required to protect an area approximately 30 km x 30 km for a 300-day mission can be loaded on a standard flyaway, 463L-airframe pallet. In all, five separate technology transitions originated from this program

3. *Pre-Planned Product Improvement (P3I) - Biological Integrated Detection System (BIDS)* by Mr. Bruce Jezek, and Mr. Patrick Berry, ECBC.

**Summary of Achievement:** Mr. Bruce Jezek and Mr. Patrick Berry developed and fielded an improved Biological Integrated Detection System (BIDS) to the Army's second biological detection company. The first U.S. biological agent detection system, the M31 BIDS (also developed by Mr. Jezek and Mr. Berry), is a non-developmental (NDI) item consisting of primarily off-the-shelf instrumentation. The system links fluorescent aerodynamic particle sizing, flow cytometry, pyrolysis mass spectrometry, and immunoassay technologies in a complementary, layered manner providing the first ever detection/identification capability for large-area biological attacks. The P3I system, the subject of this award, provides an expanded and semi-automated detection/identification capability, allowing the soldier to detect and identify twice the number of biological agents in half the time of the NDI system.

4. *New Electronic and Photonic Polymers for Warrior Systems* by Dr. Lynne A. Samuelson, Natick Soldier Center (NSC).

**Summary of Achievement:** Dr. Lynne Samuelson has advanced science through her outstanding accomplishments in providing for the first time an alternative biocatalytic route to the synthesis of advanced polymeric materials. This technology is particularly attractive because it is completely benign, simple (one step), and uses very mild aqueous conditions. The process is also general as numerous ionic templates and derivatized monomers may be interchanged to build in desired functionality. In addition, templates from renewable sources, such as ligands and even DNA can be used. Metal-like electrical conductivities, Non Linear Optical (NLO) activity and optically driven large amplitude surface relief gratings are obtained from these

biologically derived polymeric materials. This work has the potential to reap great technological, economic and environmental benefits to DoD, industry, and the civilian sector.

*5. Biomechanics for Improved Combat Footwear* by Dr. Carolyn K. Bense, NSC.

**Summary of Achievement:** Dr. Bense applied unique, objective, biomechanical methods and analyses to the design of combat boots. By executing a scientifically based program of research, she defined for immediate application to soldier needs valid approaches to design of military footwear. Dr. Bense conducted research in the laboratory and in military field environments on the resulting prototype boot concepts. The outcome of the research indicates that footwear embodying quantifiable physical characteristics reduces the incidence of lower extremity injuries, enhances locomotor efficiency, and is judged acceptable by dismounted warriors in terms of comfort and performance.

The awards were presented at the **22<sup>nd</sup> Army Science Conference** in Baltimore, MD, on December 13<sup>th</sup>, 2000. Congratulations to all our winners; they are exemplary of the great work done in the SBCCOM RDEC!

The SBCCOM Rock Island Site Collective Protection Materiel (CPM) Team received Certificates of Appreciation for recognition as members of the **Team of the Quarter**, for the period of January to March 2000. As cited by the certificate, the CPM Team has performed its mission in an outstanding manner during the quarter. The CPM Team has initiated and completed several efforts,

which have resulted in cost savings in excess of 10 million dollars and will have significant implications on Chemical Defensive Equipment readiness of our allies and the U.S. armed forces. The team efforts included significant accomplishments in the areas of Acquisition Reform, cost reduction supporting the OSCR program, stocks upgrade project, and support to the Chemically Protected Deployable Medical System (CP DEPMEDS), Chemically and Biologically Protected Shelters (CBPS), and Joint Transportable Collective Protection System (JTCOPS) projects. The certificate was signed and presented on May



25<sup>th</sup>, 2000, by BG J.A. Mangual, former Deputy for Acquisition and Readiness, SBCCOM. The CPM Team members are Samir Karadsheh (Team Leader), Barbara Hawotte, Ray Holden, James Lenth, Elaine Rose, Missy Witt, Margie Tuftee, Myrna Dowell, Luz Huffman, John Swarney, Betty Zerboglio, Mary Wischoff, Charles Day, Glen Broman, Becky Pena, and Robert Hornback.

The National Partnership for Reinventing Government (NPR) has approved the nomination of the SBCCOM Domestic Preparedness Program Team to receive the **Hammer Award**. The NPR congratulated the team for having achieved a significant milestone in reinventing existing processes. The award ceremony is tentatively scheduled for December 28<sup>th</sup>, 2000.

# FIRST WORKSHOP ON POINT DETECTION FOR CB DEFENSE

*Experts and practitioners come together to discuss Point Detection*

by Joann Brucksch

The first workshop on Point Detection for Chemical and Biological Defense was held in October in Williamsburg, VA. It was organized by the Joint Science and Technology Panel on Chemical and Biological Defense in cooperation with the U.S. Army, U.S. Navy, U.S. Air Force, and the U.S. Marine Corps.

The joint conference addressed issues related to the development of point detectors based on state-of-the-art methodologies for reconnaissance, detection, environmental and food monitoring, the health industry, meteorology and various research and industrial endeavors. Particular attention was given to the subsystems which make up a CB Point Detector and there was focus on test issues, new concepts, and future needs.

Sponsoring activities within the four services were: SBCCOM, APG, MD; Naval Surface Warfare Center, Dahlgren, VA; Office of Naval Research, Arlington, VA; Air Force Research Laboratory, Wright-Patterson AFB, OH; Human Systems Center, Brooks AFB, TX; Marine Corps Systems Command, Quantico, VA; and the Joint Program Office-Biological Defense, Falls Church, VA.

The overall objective of the workshop was to bring together experts and practitioners for a review of the state-of-the-art science and technology of CB Point Detection and related technologies to serve as the basis for the generation of a comprehensive joint Department of Defense program strategy for the development of the next-generation CB Point Detection.

## **First Point Detection for Chemical Biological Defense Workshop**

The conference consisted of a plenary session at which Dr. Anna Johnson-Winegar, Deputy Assistant to the Secretary of Defense, and COL(P) Patricia Nilo, Commandant, U.S. Army Chemical School, were key note co-speakers; system overviews and a poster session. Following is a listing of the Edgewood CB Center authors and their papers:

1. M22 Automatic Chemical Agent Alarm - Daniel M. Nowak (SBCCOM) and Rob Howard (Graseby Dynamics Limited),
2. The Block II Chemical Biological Mass Spectrometer: Point Detection for Both Chemical and Biological Warfare Agents - Alexander P. Hryniewicz and

David W. Sickenberger (SBCCOM) and Wayne H. Griest, Marcus B. Wise, Keven J. Hart, and Stephen A. Lammert (Oak Ridge National Laboratory),

3. Purification of MS2 Bacteriophage from Complex Growth Media and Analysis of the Passage of MS2 Through Various Molecular Weight Filters - Charles H. Wick (SBCCOM),

4. Rapid Extraction and Amplification of Bacterial DNA from Soil - D.E. Menking, P.A. Emanuel, and J.J. Valdes (SBCCOM), S.K. Kracke (GeoCenters, Inc.), and C. Chue (Battelle Memorial Institute),

5. Rapid Lysis and Release of Nucleic Acid from Microbial Agents for TaqMan-PCR-Based Real-time Identification - Michael T. Goode and Alan W. Zulich (SBCCOM) and Sanjiv R. Shah, Misty Lindsey, and Heena Beck (Science and Technology Corporation),

6. Comparison of Techniques for Large Scale *Bacillus Subtilis* Var. *Niger* Spore Disruption and Extraction of Target Nucleic Acids for PCR Analysis - Michael R. Goode and Alan Zulich (SBCCOM), Kevin R. Kearns and Stacey M. Broomall (Science and Technology Corporation), and Chuck Cross (U.S. Army High

School Science and Mathematics  
Faculty Program),

7. Detection of *Francisella Tularensis* Using a Hand-Held PCR Thermocycler - Peter Emanuel, James Rogers, and James J. Valdes (SBCCOM), Ted Hadfield (Armed Forces Institute of Pathology) Calvin Chue (Battelle Memorial Institute), and Ronald Koopman, James Richards, William Benett, Paul Stratton, Dean Hadley, and Fred Milanovich (Lawrence Livermore National Laboratory),

8. Production of Monoclonal Antibodies: Validation of Processes and Products for Critical Reagent Repository - Tracey H. Coliano, Ameneh M. Arasteh, and Peter A. Emanuel (SBCCOM) and Karen S. Heroux, Sarah Cork, Jun T. Park, and Suzanne Kracke (Geo-Centers, Inc.),

9. Peptide Epitopes and Mimetics - Roy G. Thompson, Akbar S. Khan, Ameneh M. Arasteh, and James J. Valdes (SBCCOM).

10. Dissociation Enhanced Lanthanide Fluoroimmuno Assays (DELFI<sup>®</sup>) for Detection of Foodborne Pathogens and Agents of Biological Origin - Deborah L Menking, Michael T. Goode, and Alan W. Zulich (SBCCOM) and Emily D. Myers (Science and Technology Corporation),

11. Microorganism Identification by Mass Spectrometry and Protein Databases Searches - An Analysis - Ravi P. Lall and A. Peter Snyder (SBCCOM);

12. Improvements in Detection Capabilities and Data Analysis with the Pyrolysis Gas Chromatography-Ion Mobility Spectrometer Biodector - Philip Coon and A. Peter Snyder (SBCCOM) and Ashish Tripathi and Waleed Maswadeh (Geo Centers, Inc.),

13. Retention Indices and Mass Spectral Study of In-Situ Generated Designer G-Agents - H. Dupont Durst (SBCCOM), David J. McGarvey and Barry Williams (EAI Corporation), and W. Gary Mallard (National Institute of Standards and Technology),

14. Non-Intrusive Analysis of Chemical Agent Identification Sets (CAIS) Using a Portable Fiber-Optic Raman Spectrometer - Steven Christesen, Brian MacIver, Lawrence Procell, and David Sorrick (SBCCOM) and Michael Carrabba and Job Bello (EIC Laboratories, Inc.),

15. Detection and Identification of Chemical Agents in Water Using Surface Enhanced Raman Spectroscopy (SERS) on Gold and Silver Doped Sol-Gels - Steven D. Christesen and Kate K. Ong (SBCCOM) and Ed Womble, Ranjith Premasiri, and Richard Clarke (Boston University Photonics Center),

16. Flow Cytometry as a Biological Detection and Identification Platform: Advantages and Limitations - Peter J. Stopa (SBCCOM),

17. Fourier Transform Microwave (FTMW) Spectroscopy, A New CB Detection Technique - A.C.

Samuels, J.O. Jensen, M.W. Ellzy, and J.M. Lochner (SBCCOM) and R.D. Suenram, D.F. Plusquellic, and R.S. DaBell (National Institute of Standards and Technology),

18. Infrared, Far Infrared, and Millimeter Wave Spectroscopic Measurements on Biological Materials: Bacterial Spores, Pollens, and Mold - Alan C. Samuels, James O. Jensen, William R. Loerup, Michael Ellzy, J. Michael Lochner, Dorothea Paterno, and Kate K. Ong (SBCCOM), Dwight Woolard (Army Research Office), and Tatiana Globus (University of Virginia);

19. Biological Particle Parameters Obtainable from Polarized Light Scattering - Burt B. Bronk and Merrill E. Milham (SBCCOM) and Zhao Z. Li and Jozsef Czege (USUHS),

20. Ambient Background Characterization Web Site - Dorothea Paterno (SBCCOM) and Allen Smith (Oak Ridge National Laboratory),

21. Ambient Bio-Aerosol Considerations on Collection, Detection and Identification Efforts, Charles H. Wick and Amnon Birenzvice (SBCCOM),

22. Web-Enables Dissemination of CBD Sensor Information - Mohammad R. Asif and Charles H. Wick (SBCCOM) and Zhenhua Jiane, Robert Johnson, Dave LePoire, and Pan Richmond (Argonne National Laboratory),

23. Detection of Biological Warfare Agents Using Quadrupole

Resonance Technology - James O. Jensen (SBCCOM) and Hector G. Robert and Pablo J. Prado (Quantum Magnetics, Inc.),

24. Dendrimer-Based Alert® Ticket: A Novel Hand-Held Nanodevice for Bio-Agent Detection - K. Ong, H.D. Durst, and P. Emanuel (SBCCOM), R. Yin, M. Bratcher, A. Jenkins, and G. Hagnauer (U.S. Army Research Laboratory), and R. Hydutsky and R. Cheng (Geo-Centers, Inc.),

25. Luminescent Sensors for the Detection of Chemical Agents in Water - Dujie Qin, Janet Jensen, and H. Dupont Durst (SBCCOM) and Amanda Jenkins and Ray Yin (U.S. Army Research Laboratory),

26. Assembly of Gold Nanostructured Films Templated by Colloidal Crystals and Use in Surface-Enhanced Raman Spectroscopy - Kate K. Ong and Steven D. Christesen (SBCCOM) and Peter M. Tessier, Olin D. Velez, Abraham M. Lenhoff, and Eric W. Kaler (University of Delaware),

27. Detection of Highly Toxic Chemical Vapors and the Case for Small, Fast Analytical Instruments - Dennis M. Davis, Vincent M. McHugh, Donald B. Shoff, and Charles S. Harden (SBCCOM) and Stephen J. Taylor and Alan M. Brittan (Graseby Dynamics, Limited),

28. Side-by-Side Comparison of Small, Hand-Held Ion Mobility Spectrometers and Surface Acoustic Wave Devices - Charles S. Harden, Dennis M.

Davis, Donald B. Shoff, and Vincent M. McHugh (SBCCOM) and Gretchen Blethen (Geo-Centers, Inc.),

29. Identification of Anthrax-Specific Signature Sequence from *Bacillus Anthracis* - Tu-chen Cheng (SBCCOM) and Vipin K. Rastogi (Geo-Centers, Inc.),

30. Recombinant Antibodies for the Detection of Bacteriophage MX2 and Ovalbumin - Kevin P. O'Connell, Peter A. Emanuel, Akbar S. Khan, and James J. Valdes (SBCCOM), Timothy J. Stinchcombe and Robert Shopes (Tera Biotechnology Corp.), and Maha Khalil and Mohyee E. Eldefrawi (University of Maryland School of Medicine),

31. Immunomagnetic One-Step Assay for Detection of Biological Agents - Deborah L. Menking, Michael T. Goode, and Alan W. Zulich (SBCCOM) and Emily D. Myers, Brice T. Voelker, and Rebecca L. Tanner (Science and Technology Corporation),

32. Force Protection from Biological Aerosols Using a Portable Hyphenated Analytical System - A. Peter Snyder (SBCCOM) and Ashish Tripathi and Waleed M. Maswadeh (Geo-Centers, Inc.),

33. Automated Sample Processing for Mass Spectrometric Identification of Biological Agents - Thaiya Krishnamurthy and Rabih Jabbour (SBCCOM), Dennis C. Roser (Geo-Centers, Inc.), and Remco Swart (LCPackings),

34. Strategies for the Detection of Unknown Biological Materials - Peter J. Stopa (SBCCOM),

35. Aerosol Generation for Testing BW Detectors - Jerold R. Bottiger, Edward W. Stuebing, and Paul J. Deluca (SBCCOM),

36. An Absolute Reference Sampler for Unbiased Sampling During Field Trials - Paul Deluca, Daniel Wise, Robert Doherty, and Daryl Jones (SBCCOM),

37. Performance Characterization of Developmental and Next Generation Bioaerosol Collectors - Agnes Akinyemi, Jerold Bottiger, Robert Doherty, Edward Stuebing, and Daniel Wise (SBCCOM) and Jana Kesavan (Independent Contractor),

38. Surface Sampling Capability for Chemical Point Detection Systems - Elizabeth S. Catalano (SBCCOM),

39. BioHaz™: A Sampling and Screening Concept for First Responders - Peter J. Stopa and Philip A. Coon (SBCCOM), David Trudil (Hew Horizons Diagnostics Corporation), and Randy Bright (EAI Corporation),

For additional information, please contact Mr. Kirkman Phelps, Commercial (410) 436-2675, DSN 584-2675 or email [kirkman.phelps@sbccom.apgea.army.mil](mailto:kirkman.phelps@sbccom.apgea.army.mil)

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## SYMPOSIA

### *In September:*

Mr. Robert Gross was an invited speaker at the U.S. and Bahrain **Military Cooperation Council Conference**. He spoke at the Cooperative Defense Initiative subcommittee meeting on the Center's 1999 evaluation of the Bahrain Defense Force CB defense equipment.

### *In October:*

Some of SBCCOM's technologies were showcased at the **DOD Technology Exposition 2000**, which was attended by defense acquisition managers, who were invited to review technologies that are expected to be ready for transition to system development within the next 5 years. The SBCCOM exhibit featured the agent impermeable membrane suit, standoff CB detection, and point detection (Pyrolysis-Gas Chromatograph-Ion Mobility Spectrometry with an MM-2 aerosol concentrator).

The **Zero Footprint Camp (ZFC)** program was accepted for display at the **Association of the United States Army (AUSA)** Army Materiel Command Corporate Exhibit for the *DOD Technology Exposition 2000*. The theme of this year's meeting was, *Transforming the Army for the 21<sup>st</sup> Century*. ZFC is sharply focused on the Army Vision to provide supporting technologies that reduce the Army's logistics

footprint and replenishment demand, and enable the Army combat systems and other elements of the objective force to be lighter, faster, and more deployable.

The NASA-sponsored Technology Transfer Conference and Exposition (TECH 2010) was held in Seattle. It is the Nation's premier venue where more than 5,000 decision-makers seek new products, business ideas, engineering solutions, and manufacturing process improvements. SBCCOM's RDA Enterprise partnered with the APG Business Development Office to showcase and market our most promising technologies, products, and services available for partnering with industry and academia.

Representatives of the Improved Response Program presented at the University of Missouri Fire Rescue Training Institute's **Fourth Annual Special Operations Symposium**. The symposium offered chemical terrorism response guidance based on results of the Chemical Weapons Improved Response Program (CWIRP). Dr. Fedele, ECBC, presented an overview of the CWIRP, along with risk analysis and guidance for quick rescue in chemical vapor contamination using bunker gear and SCBA. Mr. William Haskell, NSC, presented research and development efforts aimed at equipping the soldier with micro-

technology systems that will greatly increase battlefield awareness and capability. This technology may also greatly enhance the first responder's capability.

Dr. Robert Kroutil presented a series of invited lectures on infrared spectroscopy for standoff detection to the faculty and cadets at the U.S. Military Academy at West Point, NY. Over 120 cadets and 30 faculty attended the invited lectures. A question and answer session for the cadets was sponsored by the Academy's Chemistry Department to discuss the future role and application of infrared spectroscopy for the airborne detection of chemical vapors.

### *In November:*

Harry Salem, PhD, and Eugene Olajos, PhD (ECBC) and William Stokes, DVM (National Institute of Environmental Health Sciences) will co-chair a conference, entitled **Alternative Toxicological Methods for the New Millennium: Science and Application**.

*Upcoming Conferences*

<i>Date and Place</i>	<i>Title</i>	<i>POC</i>
<i>1-3 February 2001 Crystal City, VA</i>	<i>11<sup>th</sup> Annual SO/LIC Symposium</i>	<i>Ms. Brenda Eckstein (410) 436-2879</i>
<i>28 February - 2 March 2001 Ft. Lauderdale, FL</i>	<i>Winter AUSA Symposium</i>	<i>Ms. Brenda Eckstein (SBCCOM) (410) 436-2879</i>
<i>5-8 March 2001 San Antonio, TX</i>	<i>17<sup>th</sup> Annual Logistics Symposium and Exhibition</i>	<i>Ms. Joann Brucksch (Edgewood Area) (410) 436-5383</i>  <i>Mr. David Emond (Natick Area) (508) 233-5865</i>
<i>6-8 March 2001 Hunt Valley, MD</i>	<i>Scientific Conference on CB Defense</i>	<i>Ms. Dottie Berg (410) 436-4883</i>
<i>14-18 May 2001 Orlando, FL</i>	<i>International Workshop on Applications of Enzymes in CB Defense</i>	<i>Dr. Joseph DeFrank (410) 436-3749</i>
<i>June 2001 Edgewood, MD</i>	<i>Scientific Conference on Obscuration and Aerosol Research</i>	<i>Dr. Edward Stuebing (410) 436-3089</i>
<i>15-19 June 2001 Stockholm, Sweden</i>	<i>International Symposium on Protection Against Chemical and Biological Warfare Agents</i>	<i>Ms. Brenda Eckstein (410) 436-2879</i>
<i>9-13 July 2001 Ft. Leonard Wood, MO</i>	<i>Worldwide Chemical Conference</i>	<i>Ms. Brenda Eckstein (410) 436 2879</i>

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## PUBLICATIONS

### BOOKS, JOURNALS, AND MAGAZINE ARTICLES

**The Army Chemical Review**, the professional journal of the U. S. Army Chemical Corps, accepted a technical article on the Improved Response Program for publication. The article, titled *Helping the Civilian Community: The Improved Response Program*, will be published on pages 11-15 of the journal's January 2001 issue. The

article is reproduced in this document beginning on page 10. It describes the IRP's purpose and mission and the challenges associated with responding to domestic chemical and biological terrorism. It also provides readers with descriptions of solutions developed by the IRP to improve response to such incidents.

### TECHNICAL REPORTS

*Published technical reports, when available, should be requested from the Administrator, Defense Technical Information Center, ATTN: DTIC-FDRB, 8725 John J. Kingman Road, Ste 0944, FT Belvoir, VA 22060-6218.*

Report No.	Title	Author(s)
ECBC-CR-025	Feasibility Assessment of the Use of Canines to Detect BW Agents, January 2000, UNCLASSIFIED - public release.	S.A. Lawhorn
ECBC-CR-036	Shear Horizontal Acoustic Plate Mode (SHAPM) Sensor for Biowarfare Toxins, November 2000, UNCLASSIFIED - public release.	J. Andle
ECBC-CR-037	Reactive Fragment Studies, November 2000, UNCLASSIFIED - limited.	M. Riley
ECBC-CR-038	Enhancement to a Mask Filter Prototype Design, November 2000, UNCLASSIFIED - limited.	K.D. Hofacre S.J. Lawhon A.W. Richardson A. Wang B.L. Rubal
ECBC-TN-003	Density Measurements of Materials Used in Aerosol Studies, October 2000, UNCLASSIFIED - public release.	J.Kesavan R.W. Doherty
ECBC-TR-002	Toxicity of a Biodegraded Chemical Warfare Agent (Mustard) to Aquatic Organisms, June 2000, UNCLASSIFIED, public release.	M.V. Haley C.W. Kurnas J.A. Ware

ECBC-TR-083	Support to Open Air Decon Testing, September 2000, UNCLASSIFIED - limited.	J. Pence B.R. Williams H.D. Durst
ECBC-TR-103	Use of Fluorescein in Aerosol Studies, September 2000, UNCLASSIFIED - public release.	J. Kasavan R.W. Doherty
ECBC-TR-104	Reactions on Silver Exchanged Zeolites, A. Phosphonothiolates, B. Chlorosulfides, August 2000, UNCLASSIFIED - public release.	P.W. Bartram G.W. Wagner
ECBC-TR-106	Report of the Joint-Service Collective Protection Assessment Team on U.S. Air Bases in Southwest Asia, August 2000, UNCLASSIFIED - limited.	W.K. Blewett R.L. Heiden
ECBC-TR-112	Human Factors Assessment of Domestic Military, Foreign Military, and Commercial Respirators, September 2000, UNCLASSIFIED - limited.	D.M. Caretti
ECBC-TR-113	Hypothetical Attack on Alpha Building Using Chemical or Biological Agents, September 2000, UNCLASSIFIED - limited.	P.G. Schabdach W.C. Patrick III
ECBC-TR-116	Defense Technology Objective (CB-02-10-D) Joint Warning and Reporting Network Visualization Software, October 2000, UNCLASSIFIED - limited.	M.K. Asif C.H. Wick J.J. Height R. Johnson Z. Jiang D.Lepoire A. Huttenga P. Richmond
ECBC-TR-117	Summary Report on Development of XM89 Enhanced Incendiary Grenade, October 2000, UNCLASSIFIED - limited.	E. Song G.V. Tracy
ECBC-TR-118	Infrared Absorptivity of Bacillus Subtillis (Bg) and Several Battlefield Aerosols, November 2000, UNCLASSIFIED - limited.	D. Flannigan R. Doherty A. Samuels
ECBC-TR-122	Health Hazard Evaluation of Candidates for the Joint Service Fixed Site Decon (JSFXD) Program, November 2000, UNCLASSIFIED - limited.	M.V. Haley L.L. Miller
ECBC-TR-123	Analysis of Unmanned Aerial Vehicle-Chemical Biological Intelligence, Surveillance, Reconnaissance (UAV-CBISR), November 2000, UNCLASSIFIED - limited.	M.K. Asif
ECBC-TR-124	Joint Service Agent Water Monitor (JSAWM) Program Technology Evaluation, November 2000, UNCLASSIFIED - limited.	J.L. Jensen W.R. Loerop J.D. Walther S.Hyde

ECBC-TR-127	Molecular Modeling Analysis and Protein Engineering Design for Enhancement of VX Hydrolysis Activity by Organophosphorus Hydrolase from Pseudomonas Diminuta, November 2000, UNCLASSIFIED - public release.	W.P. Ashman
ECBC-TR-128	Research and Technology Development Process for Nuclear, Biological, Chemical (NBC) Defense in Science and Technology (S&T) Efforts, November 2000, UNCLASSIFIED - limited.	M.K. Asif
ECBC-TR-129	Neighborhood Emergency Help Center, Concept Validation Final Report, November 2000, UNCLASSIFIED - public release.	J.D. Walther M. Freeman S. Hayes
ECBC-TR-130	Organization Structure for Nuclear, Biological, Chemical Information Technology (NBC-IT) Team for Science and Technology (S&T), December 2000, UNCLASSIFIED - limited.	M.K. Asif

